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Fostering Good Relations

What Consumers Ask For

ELECTRICITY is not essential to the running of the home. This may seem a strange way of introducing our Domestic Issue but it is an important fact which the electrical industry must constantly bear in mind. Suppliers of electricity have a monopoly in their area, but electricity has no monopoly in the home. It meets with competition from a number of alternative methods.

Consequently one would imagine that the vendors of electricity would follow the practice of others who have commodities to sell : that they would encourage people to employ their services, and having secured their custom would endeavour to keep them satisfied and asking for more. It is undeniable that many of them pursue this course, but it is equally true that many more, both municipal and company-owned, work on the " take it or leave it " principle.

How are consumers' requirements being met? The first one—a cheap and constant supply—is generally catered for. There are still districts in which prices are either too high or not as low as they might be, but it is a fact that 97 per cent. of the consumers can obtain electricity at 1d. per kWh or less, over 85 per cent. at ¾d. or less, and over 60 per cent. at ½d. or less. Therefore the price of energy is not a serious hindrance to development.

Red Tape and Rigidity

But when a consumer applies for a connection is he greeted with open arms? As a rule he is not; he is presented with a long closely printed agreement form which lays more stress on penalties than privileges. Few undertakings adopt the practice instituted in one town where the conditions are briefly stated on a postcard. The two-part tariff, the method by which all domestic consumers should be charged, is not explained properly. A consumer will inevitably want to know why he must first pay something for nothing and then how that fixed charge is calculated. Some undertakings are too rigid in their computation of this charge; others practically tell the consumer that how it is worked out is none of his business.

The other day a reader drew our attention to an agreement, signed by him rather hurriedly, in which a net rateable value of about twice the rating authority's assessment had been used as a basis for calculations. After paying one or two accounts the consumer discovered the error and told the company. The latter merely replied that he had signed the agreement and it was too late to alter it. Preferring not to seek expensive (and perhaps uncertain) legal redress this consumer has reduced his bill by having a water heater removed. If this were an isolated case we should put it down to some individual's obtuseness. Unfortunately we hear of too many similar instances.

Inconvenient Installations

We now turn to the installation. Unless the consumer is wise enough to employ an electrical contractor who knows his job thoroughly he is at the mercy of the incompetent contractor or too-often hidebound supply authority. The idea of the last two is that " points are points." So long as each room has one it doesn't matter where it is or what it looks like. For the sort of thing we mean we refer readers to an article " Consumers' Grouses " on page 481 of this issue.

The problem of appliances is a big one and it has to be acknowledged that most authorities are doing their best. But here again ample scope for better organisation exists and we hear frequent complaints that consumers cannot get what they want when they want it—even if their requests are reasonable ones. Such delays are particularly annoying upon moving into a new house, and that is where the gas people often score, for they are first on the doorstep with prompt service.

That last word brings us to the fourth principal requirement. When apparatus is supplied to customers everything possible must be done to keep it in use—to the advantage of both supply authority and consumer. Yet we repeatedly hear of apparatus being out of action for abnormally long periods while the consumer gets along as well as he can without it or, frequently, changes over to something else. Consumers' own appliances are in a class by themselves. Often enough they do not seem to be favourably regarded by supply authorities who consider that it is not their business to keep them going. If they do undertake repairs or replacements they charge too much for them, but they are prone to send the appliances back to the makers—or tell the consumer to do so, when they are quite capable of doing what is necessary.

We may be accused of making much out of nothing—but as a little leaven leaveneth the lump so does a little trouble between supply authority and consumer poison the general relationships between

the two parties. If a satisfied consumer is the best advertisement a disgruntled one, who will not hesitate to air his grievances to his neighbours and acquaintances, has a far greater influence, for people are always willing to hear and believe the worst of public bodies.

No matter how good an authority is in a general way, a few dissatisfied consumers can kill its reputation. We know that too often consumers are unreasonable but with patient, thoughtful and helpful treatment they can be converted from hostility to friendliness, and staffs should be trained to achieve such conversions.

Preston Pacemaking

MR. G. A. ROBERTSON, who last year became one of the youngest borough electrical engineers in the country when, at the age of thirty-two, he was appointed "chief" at Preston, is able to record exceptional activity during his first year of office. Unlike many undertakings, that at Preston experienced no slowing up in development in the past year. Increases took place in all classes of supply, industrial, commercial and domestic, and the total expansion of nearly 10 million kWh was the highest in the history of the undertaking. Nevertheless, Mr. Robertson recognises the "serious competition from other sources in the domestic field, which is increasing every year," and a special canvassing section has been formed to pursue a vigorous policy of load development, the achievements of which will be watched with interest. Another step in the right direction is the recent decision of the Council to make substantial reduction in charges in spite of the higher costs.

More Light for Miners

VIGOROUS action towards raising the standard of illumination in collieries was strongly advocated recently by the Miners' Nystagmus Committee of the Medical Research Council. A similar note of urgency is apparent in a circular issued by the Mines Department setting out the lines along which progress can be made as a result of recent developments. Among the latter are krypton-filled safety lamps; the increased light obtained from these, the Secretary for Mines considers, is well worth a slightly greater cost compared with argon-filled lamps. It is disappointing that so little advance has been made in mains lighting in spite of the removal of restrictions, and the need to extend its use to all places where it is safe and practicable to do so is especially emphasised in the circular. Another development which should do much towards the improvement of such fixed points as loading places, junctions and sidings on haulage roads is the introduction of 100-V mercury-vapour lamps in conjunction with air turbines, which are permitted by the regulations in any part of a mine.

American Precautions

WE have seen during the past few weeks that the United States has been unable to remain indifferent to events many thousands of miles away. One aspect of this matter has been the appointment by President Roosevelt of a committee to study methods to ensure an adequate and continued supply of electric power in the event of a national emergency. Representatives of the military, naval and finance departments, and of the Federal Power Commission and National Resources Committee, have been appointed to the new body. Some of the power utility interests became apprehensive on learning of the President's decision, fearing that it was cover for a further attack upon them, but our contemporary, the *Electrical World*, says the views expressed by members of the Committee do not support this theory. It was found during the Great War that there was a shortage of power in the chief industrial centres, and a lack of flexible and adequate interconnection arrangements which would have enabled advantage to be taken of the diversity factor.

The I.E.E. Programme

DURING the first three months of the coming session of the Institution of Electrical Engineers a great variety of subjects will be dealt with at ordinary meetings. Starting with the presidential address of Dr. A. P. M. Fleming next Thursday week, the programme includes two papers on research and testing, two on different aspects of heating, one for power station men and another for mining electrical engineers, while communications and the design of small motors are each given an evening. So wide is becoming the field of electrical engineering that many subjects that once occupied a large portion of the time available are not down for discussion. Such subjects include, to take a few items haphazard, transmission, distribution, installation, transport, industrial heating and power and metering, lighting. Some of these may appear in the second half of the session while others will doubtless be dealt with in the appropriate Sections, the value of which is likely to become more evident each year.

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London Transport's Example

WE have had occasion several times in the past to refer, with approval, to the advertising methods of the London Underground system both before and since its acquisition by London Transport. Its posters are often works of art and nearly always enjoyable and its Press announcements are telling and attractive. An advertisement which appeared in newspapers last week drew attention to the power behind the Underground railways, mentioning the two power stations, the 64 sub-stations and the two million units of electricity supplied daily to run the trains, lifts, escalators, fans, lighting, etc. "Every device known to science to make the supply reliable" was claimed to be in use on the system. It might almost have been an advertisement of the electricity supply industry. We would like to see E.D.A. supported to such an extent that the supply industry could do throughout the country what London Transport does in the Metropolis to get on good terms with its customers.

Science and Art

IN her thought-provoking article in this issue, Lady Brooke deprecates the use of the word "science" in relation to kitchen planning, which she regards as an art. In this, no doubt, she is right. Science, which deals with abstract principles, systematises natural knowledge and leads to results that can be repeated indefinitely by following the same formulæ, is an incorrect as well as pretentious expression in this connection. While art, according to the dictionaries, is the exercise of practical skill (as in "artificer"), it nevertheless has a common significance of an imaginative ability to relate what science can provide to the most deeply felt human needs and to the socially very valuable diversity of individual preferences. Schemes that have more in view than commercial efficiency will have to pay regard to those imponderables which may be included in the terms "art."

Rationalisation in the Home

By Lady Brooke, M.A.

The authoress, who is well known as an active worker for the Electrical Association for Women, puts forward ideas for the better arrangement and equipment of the kitchen and for a more intelligent use of electric heating in the home.

Lady Brooke
Photo.: Valentine, Hampstead, London

THE advent of electricity into the domestic sphere has an especial significance for our present age. It is so much more than the substitution of a perfectly efficient, convenient, flexible, labour-saving agent for the production of heat, light and power, in place of the old laborious, inefficient, haphazard methods. Providing, as it does, a single means of running a house from top to bottom, it brings unity and consistency for the first time into the domestic side of life, and puts the home within the scope of that rationalisation, design and planning which have captured our modern mind.

This unified conception must be admitted to be still to a great extent an ambition rather than a reality. There are plenty of beautifully electrified homes, of course, among well-informed, enterprising people in the well-to-do classes; and here and there, under the wing of progressive boroughs and supply authorities, new housing schemes have been very comprehensively electrified. But between the two extremes, in the middle (I very nearly, very accurately, wrote "muddle"), are the hundreds and thousands of houses that we all know too well, those domestic hybrids, partly, tentatively electrified, with a confused medley of equipment, electricity here, a coal fire there, a gas fire or two, coke boilers, geysers, cookers of various kinds, all the *disjecta membra* of past stages of development; as if one were to have a motor-car with wooden wheels, acetylene lamps, an electric horn, perhaps, and blinkers on the bonnet.

This confusion is not confined only to older flats and houses with out-of-date equipment that it may be difficult to displace. New houses and flats are rising daily in which a rational, modern scheme could so easily have been realised; yet many of them wantonly perpetuate confusion by this mixture of the means of providing heat and power. At a recent exhibition in which a series of model houses was shown, the lack of uniformity was remarkable in the equipment of each house. One was all-electric, the rest mixed, a little bit of everything in each—coal, coke, gas, electricity, anything might turn up anywhere; consistency had not been thought of.

More help might be given by manufacturers in this direction. If appliances even looked alike in their outward style, or measured alike, they would at least suggest uniformity, and encourage more complete electrical installations in the home. Firms who can supply something like a complete domestic equipment, and one at any rate can, are making a good contribution to progress; but those who mix colours and styles in their appliances, turning out green cookers, blue washers, some with bow legs, some with straight, and with haphazard shapes and measurements, are sinning against the light. One does not have chairs of different heights round a dining table, nor stairs with a variety of sizes in steps. In most things in a house which have some similarity of function there is a ruling consideration which determines, and secures some uniformity and harmony of proportion and line. Why not in electrical appliances?

Kitchens, fortunately, with their definite functions and special apparatus, are an obvious field for systematisation; and the new science of kitchen-planning (could it not be called "art," instead of science, a feminine, domestic art? Science is such a pretentious word!) testifies to the demand for planning and the interest women are prepared to take in it. Kitchens, at last, are being visualised as places for cooking, for skilled work, not for endless walking and needless hard labour; and electrical appliances, untethered as they are to flues, to any piping or plumbing, give liberty of arrangement and can be placed precisely wherever is most convenient.

From a quantity of study and investigation which seems sometimes over-elaborate (an august contemporary has been exploring every hand-movement and step in kitchens, and every air current, in pursuit of the elusive absolute), certain admirable and quite simple principles are emerging that can be applied to a wide diversity of circumstance. The three "centres," preparation, cooking, and cleaning, anatomise, so to speak, the kitchen work, and lay out the fundamental logic of kitchen arrangement irrespective of the size of the kitchen or the style of the household. Planned on this basis and with work-surfaces at the proper points with cupboards above and below (duly recessed below for the toes) to hold the stores and utensils pertaining to each "centre," a kitchen, however modest, can be an intelligent, labour-saving workshop.

The "unit" kitchen is the undoubted ideal in this direction, with its beautiful, uniform steel cabinets; but such things, it must be admitted, are not for everybody, whereas electrical appliances most emphatically are. Any intelligent woman, with a little advice from her supply undertaking and an obedient carpenter, can turn an ordinary kitchen into an ideal one, if the above-mentioned essential principles are kept in view; for they can be adapted to fit any existing arrangement of windows and doors. It is very important that good arrangement should in no way be associated with expensiveness, and that it should not sound too scientific, profound or alarming. After all, nearly everybody can arrange a bedroom or sitting-room with regard for convenience and the various uses of the room; so, in an elementary way, why not a kitchen?

Many supply undertakings issue valuable and helpful leaflets explaining the uses of electrical appliances, their cost and so forth; would it not be possible to add some simple hints on kitchen planning, now that these fundamental principles have begun to emerge? Interest in electric kitchens would be stimulated, and complete electrical installations would be encouraged.

Safety can also be served by good planning, for an awkward arrangement may be dangerous. In a kitchen I know, a tiny one, the cooker and sink are crowded together between two doors, with no work-surface near or between them. The kettle was installed on the side of the cooker away from the sink, and when it had to be filled the flex trailed across the hot-plates and was constantly singed till a rule was made that it must be filled by means of a jug. The only place for the kettle to stand is on the vacant hob of the cooker, where it is much in the way when cooking is being done. If the sink had been a little smaller (it is large enough for a big house!) and the cooker had been moved a few spare inches towards the door, about 18 inches of space could have been con-

An artist's impression of a planned kitchen (*Jackson Elec. Stove Co.*)

Capturing the Domestic Load

By V. W. Dale

What the supply industry has to do

Mr. Dale is well known to the industry as business manager of E.D.A.

THE unsettled state of international affairs during the last year or so has already made itself felt somewhat acutely and to an extent sufficient to cause some misgiving. So long as electricity supply is predominately industrial so long will it prove a fairly reliable trade barometer and amongst the important public services is bound to be one of the earliest victims of even a temporary trade recession, as we have seen only too clearly revealed in recent official returns of output.

The really important lesson to be learned is the fact that this drooping curve is unrelieved, as regards the sense of disappointment it has occasioned, by the very fair assumption that the descent was really by no means inevitable. Speculators and the City need have little fear: electricity supply has not reached the peak of its demand—very far indeed from it. Those of us who have been engaged in supply work for the last thirty years or more know that the paradox is absolutely true when we say that—up to the present at all events—every day we recede farther from saturation: new fields for demand and new opportunities present themselves at a greater rate than we are apparently able to grapple with existing ones.

A critical examination of the electricity supply industry's selling organisation and business methods was perhaps never more timely than at present. The author points to some weak spots which need attention if the industry is to capture the enormous potential domestic load.

That there is most certainly no logical reason for recession in demand for electrical energy at the present time or, if peace is preserved, for a long time to come, is clearly established by the aggregate maximum demands for the years 1921 to 1936 covering a period of unparalleled industrial depression. During those fifteen years the curve persisted in its upward trend whilst the increase in consumers in this country was phenomenal. That, as everyone knows, was due mainly to the concentrated effort which the industry made to cultivate the domestic consumer by introducing attractive tariffs and easy installation facilities. But cultivating the domestic *consumer* is not the same thing as cultivating the domestic *load*. It is in this latter direction that, with notable and meritorious exceptions, so much leeway has to be made up.

The consumption per head of population as shown in the Electricity Commissioners' latest Report stands at 370 kWh. Most of us know full well from our own personal experience that a figure of 1,000 to 2,000 kWh, for domestic purposes only is not only entirely feasible, but in most areas it is a perfectly economical proposition for the bulk of our existing consumers. Is it, therefore, too ambitious a project for the electricity supply industry to aim and plan and work to raise the consumption figure of 370 to 1,000 kWh per head? When we aimed a little while ago at a million new consumers we scored 82 per cent.; a target is always useful—why not let it be a thousand units?

On the books of our 600 or so undertakings we now have no fewer than eight and a half million domestic consumers, representing more than 80 per cent. of the population, and of these at least seven and a half million are "prospects" for something more than half a dozen lighting points and a miserable 100 kWh a year. If each one of these consumers can be sold the idea of an electric cooker and a water-heater, the extra energy thus consumed would be of the interesting if not staggering order of 30,000 million kWh per annum; in other words, nearly twice as much as the present total demand for all purposes, while the additional revenue would probably be of the order of £140,000,000. That is the rich reward almost within reach of the supply side of the industry and does not take into account the harvest

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Rationalisation in the Home (*Continued from preceding page*)

trived for a work-surface between cooker and sink, which could have accommodated the kettle, and would have been useful in many ways.

Before leaving the kitchen, it might be pardonable to suggest that a work surface, "counter" it is sometimes called, might be renamed a bench. Work-surface is cumbrous; counters recall the frivolities of gambling. Benches are what people use to work upon.

Here and there development has taken a direction that is not entirely satisfactory through insufficient planning. Heating, for instance; the very convenience of electric heaters has been a disadvantage, because it is much too easy to switch them off. Electric heaters attained an early popularity, with their enchanting comfort and extraordinary convenience; but, used effectively, they are inevitably regarded as expensive to run, and there is a tendency to switch them off, when all the heat accumulated is wasted. They are certainly at their best in bedrooms, in rooms used only occasionally, as additional to other forms of heating, and between seasons and in the cold summers and hot winters experienced in these islands. But a large room cannot be satisfactorily heated with a radiant heater even of three kilowatts as its only source of heat; partly because it will inevitably be periodically switched off; and we all know those dining-rooms, there are thousands of them, heated with a radiant fire set panel-wise in one wall, in front of which the nearest guest is fainting, while the rest of the company, screened by the fainting guest, freeze, and will freeze some more when the fire has been switched off to avert the faint.

The remedy, of course, is properly to plan one's heating, and to realise when to use radiant heat and when to use convection. The purpose of each room should be considered, and the heat applied in the proper way accordingly. In bedrooms let the switchers-off indulge their propensity harmlessly. Here radiant heat is right; pile on the kilowatts, three will seldom be too many, for they can be switched down, and the latest reveller (or worker) returning in the chill dawn (or at whatever hour) may end his day in floods of sunshine, whatever else may have happened to it. Here economy is actually served by high loading; the heat is wanted quickly, and plenty of it, and if the radiation is adequate it will be quite unnecessary to have the heating on before the room is to be occupied, or at any time when the room is empty.

In a bedroom, also, the pleasures of a small portable heater should not be overlooked, to be hung, or placed on a table with its beam directed upon the bed to warm the shoulders and hands of the reader in bed, whether he is an invalid or just a person who reads in bed; reading in bed may be a regrettable habit, but there is no reason why people's failings should not be turned to account for the benefit of the supply undertaking!

For small rooms in constant occupation, small entrance halls and passages, convection is more comfortable than radiant heat; for large rooms and fair-sized halls, a mixture of the two is perfect, but the switchers-off must be kept away from the convector-switches, and the convector must be allowed to keep the room or hall at a certain temperature, which it cannot do if it is switched off.

With tubular or panel convectors of low loading, the right method is to have just so much as will keep the temperature between, say, sixty and sixty-five degrees, and never to switch it off at all, night or day, during the cold months. In a living-room, the addition of a radiant fire when the room is occupied tops up the heat and gives perfect psychological and physical comfort; there will be no crowding round the fire, any part of the room is pleasant, there are no floor-draughts, and no cold backs. In a small hall, where a 1-kw fire had proved inadequate, taking the whole morning to kill the cold, and costing, at ¾d., 1s. a day for 16 hours' unsatisfactory use, 4 ft. of tubular heater were substituted, with a loading of 60 W per ft. At the same rate the 4 ft. tubular heater ran the round of the clock for 4½d.; in fact, it was never switched off from October to May, the six winter months costing £3/8/5. Not a crippling sum, and the warm air percolating up the stairs and into odd corners made the house comfortable day and night; and since the air in the house was warm, the individual rooms were easier to warm up.

To electrically-minded people, full of ideals and achievement too, their heads full of thermostatic control and all the ultimate dreams of perfect electrification, all this may seem like flogging a dead horse. If only it were! Perfect thermostatic heating is being realised only by the enlightened few; the rest of us live not in dreams but in actual houses and flats, and very funny ones at that.

which would be reaped by contractors, retailers, and manufacturers of lamps, fittings, appliances, cables, accessories, and plant.

One would not presume to prescribe for every one of the industry's problems; they can only be looked at very broadly and very generally—hoping that by such a superficial process of stocktaking it may be possible to put a finger here and there on some error of commission or omission which may be hindering local development. Many years ago, in an after-dinner speech, the head of a great London store, whose name to-day is almost a household word in Britain and who might reasonably claim to be the uncrowned Emperor of Oxford Street, expressed the opinion that the opportunity to sell electricity on a big scale was something which even he envied. He probably did not realise the practical and technical difficulties, or the unfortunate history of distribution, at that time, but in the meantime it is unquestionable that many of those limitations and hindrances which existed then have since been overcome, not always in such a way as to meet with universal approbation, but nevertheless overcome.

Obstacles to Progress

With plant and copper shortage repaired, showrooms that can be numbered in thousands instead of tens, the widespread application of alternative tariffs and prices that are generally favourably competitive with other forms of light, heat, and power, and apparatus of greatly increased efficiency and reliability, what are the remaining hindrances to more rapid development of the domestic load? We can only touch on two or three of the more common causes as we see them—no less of first importance because they are so obvious.

In the first place, progress is undoubtedly restricted by individual prejudices which favour developing a particular kind of load and looking askance at another instead of going out boldly for every class. In our present state of development it is perhaps not entirely true to say that the remedy is always immediately in the hands of every undertaking, but the undertaking which finds itself labouring under real difficulties in this respect, arising out of geographical and "class" disabilities, is the exception to-day and not the rule. Generally, if the economics of the undertaking have been maintained in proper order it should not be necessary to impose restrictions on any class of domestic load.

Inadequate sales staff is very definitely another reason for arrested development. It is vital that committees and boards (it is inconceivable that it can ever be a fault of management) should get the "Oxford Street complex" and realise that electrical marketing has become a serious and highly competitive business. Most of the campaigns organised for electricity supply fall lamentably short of their estimates and expectations, and always it can be traced in a large measure to the inability of the undertakings, on account of inadequate staff, to pursue them in a thoroughly businesslike manner. Appreciation of the need for sales staff training is patchy in spite of the knowledge that competitors have not been slow to realise that selling has a technique of its own. Salesmen in the electricity industry are far too often expected to grow rather than to develop rapidly by efficient training. We must bring ourselves to realise that economics and selling are not to be regarded merely as appendages of engineering—they must be partners.

Importance of Publicity

Publicity is another supremely important factor. By publicity I do not mean Press advertising only. The word is intended to embrace all those educational propaganda activities which should in a lesser or greater degree be recognised as a part of the routine work of every sizeable undertaking at least: newspaper and poster advertising; the preparation and circulation of electrical news paragraphs and stories; exhibitions and special demonstrations; lectures to local societies; film displays; service to architects and builders, especially with regard to kitchen planning; the issue of selective direct mail letters, booklets, etc., for the development of particular classes of load; lighting, heating, and power surveys and the preparation of free reports and estimates. All this work requires to be planned and carried out in a systematic, not haphazard, manner.

I submit that although we operate for the most part parochially, we should approach our problems and obligations from a broader standpoint. We have nearly 9,000,000 electricity consumers, all of whom have electric lighting, and most of whom, at all events, are familiar with the socket and plug connecting up their radio set. It must be admitted, therefore, that the British public is already electrically minded up to a point. So far, so good. But I feel that it is electrically conscious but not electrically sub-conscious. When people require heat and power for any domestic purpose they do not turn automatically to electrical methods. In spite of the electrical revolution which has taken place in our time, comparatively few people fully comprehend that electricity is a revolution in method. Many of them still simply regard it as an alternative to, or a substitute for, gas and oil, coke and coal.

Until we have succeeded in making the general public fully electrically minded so that the sub-conscious automatically dictates electrical methods, so long will the natural progress of electricity supply be retarded. This is the job for publicity. Except in a few outstanding cases, which can be counted almost on the two hands, the committees and boards of electricity supply undertakings have not yet appreciated the necessity of putting into the hands of their managements that keen tool represented by adequate and efficient publicity and propaganda, and as a result we as an industry have so far failed to make properly and completely known to people in every walk of life the many uses and advantages of electricity. The service which adequate propaganda and advertising offers to each electricity supply authority appears to me to be as follows:—

(1) The establishment and maintenance of public confidence and the consolidation of goodwill.
(2) The uprooting of unwarranted fear, prejudice, and criticism, which is still seriously hindering electrical progress.
(3) Education of the consumer, electrically speaking, and the encouragement of inquiries for electrical information, including the means of giving efficient and easily assimilated advice as distinct from legal jargon and blue forms.
(4) The ability to investigate markets for electricity for all classes of supply more efficiently and *creating* demand.

Is Electricity Different?

A prejudice which we often have to overcome is the suggestion that electricity is so very different from other commodities of general consumption. Is it? Frankly, I have never been able to understand such a point of view. So far as the domestic user is concerned, we and the other fellows are all pulling on the same purse strings, whether it be for a greater degree of comfort, better health, indulgence in luxuries, or the score or more of appeals which daily confront the purchaser in the Press, on the hoardings, and in many other directions.

A hundred million pounds are spent annually in this country on advertising. We must grasp this modern weapon even though we may hold that to a great extent it is nothing more than a necessary evil. Nowadays advertising is inevitable. Almost every great business or service that has anything to sell or distribute does so economically by keeping the public informed by advertising, by presenting facts attractively, by placing knowledge before the public in such a way that they are impressed, and by setting in motion a perfectly ordered process of thought, first attracting attention, then creating interest, kindling a desire to possess, convincing, and impelling action to purchase.

In our task of developing electricity supply it is often urged that we have no real competitor. I submit that we actually have many competitors other than gas and raw fuel. My point is this: we know that we are rapidly approaching saturation as regards connections, and we are rapidly fulfilling all demands for what the untutored consumer might regard as sheer electrical necessities. Our main preoccupation henceforth, as I see it, is to compete effectively with other comfort-makers, luxurious necessities, and necessary luxuries; in other words, to give the public better cooking, a bath a day instead of a Saturday-night special, constant hot water for household uses, consistently pure food, power-driven tools such as vacuum cleaners, clothes washers and dish washers, clean, comfortable heat instead of cold, damp rooms, and (why not?) air-conditioned houses.

We Must Spend More

Out of the hundred million pounds spent annually on publicity in this country to which I have previously referred, the entire electrical industry—supply, manufacturers, etc.—spends less than one-half of 1 per cent.; indeed, electricity supply spends about one-seventh of the amount spent by the radio industry, one-eighteenth of that spent on beer advertisements, one-eighteenth of tobacco, one-twentieth of beauty preparations, one-twenty-fifth of patent medicine, and one-twentieth of motor car expenditure. Admitting that the figures are not truly comparable, it would still be impossible to justify the tremendous disparity.

The few trades mentioned account for about £12,000,000 of advertising and £300,000,000 of revenue, and I contend that a very great deal of this revenue could be diverted to electricity with advantage to the consumer. Between our present 370 kWh per head of population and the potential 1,000 kWh which I suggest should be our aim, there are 25,000,000,000 kWh, representing, at an average price of 1d., more than £100,000,000—certainly a prize worthy of a commensurate scheme of planned selling.

Is Standardisation Possible?

By J. N. Waite, M.I.E.E.

The variety of types and sizes of domestic apparatus on the market gives the consumer a wide choice, but does it stimulate progress? Mr. Waite speaks from experience when he deals with the difficulties which lack of standardisation involves. He also touches upon the vexed question of plugs.

ECONOMISTS would define domestic electrical demand — apart from lighting — as having elasticity meaning that reduction in cost of supply will produce an increase in use. In other words, the progress of domestic electrification is mainly dependent on the overall cost of electrical service. In that figure, the first cost of consuming apparatus forms an important item, and any steps which can be taken to reduce the cost of apparatus will be beneficial to all concerned, for it will promote sales of both electrical energy and electrical apparatus.

It will generally be accepted that standardisation tends to reduce costs of production, and from that point of view, standardisation is eminently desirable. Standardisation also saves cost in maintenance, for a smaller stock of spares can be carried, and it also simplifies maintenance in obvious ways. On the other hand, standardisation tends to restrict change, and thus tends to discourage progress, for progress can only come about through change. From this point of view, standardisation is undesirable.

The introduction of hire schemes for domestic electrical apparatus and the successful operation of these schemes have played a great part in the wonderful progress made in domestic electrification during recent years. In working these hiring schemes supply undertakings have necessarily invested a relatively large amount of capital, and they are naturally desirous that this expenditure should continue to be remunerative. Any material change in outward appearance of domestic apparatus such as cookers, kettles, wash boilers, self-contained water heaters, &c., covered by hire schemes, will quickly bring in a large number of demands from consumers to have their existing apparatus changed to that of the newer type, irrespective of the performance. Such demands, if acceded to, cause considerable expense, and also appreciably depreciate the value of the older apparatus; if they are not acceded to, trouble arises from dissatisfied users.

[Elliott & Fry

Mr. J. N. Waite is perhaps best known for his work in Hull. He left there recently to join the Central Electricity Board as manager for South-East England

The position with hiring schemes is thus very different from where the consumers purchase the apparatus either by direct sale or on hire purchase. In effect hire schemes have created a vested interest which will tend to restrict change in outward appearance so far as is possible, because such change inevitably depreciates the value of the invested capital. The more the hire schemes progress the greater will be the resistance to change in outward appearance. Manufacturers would do well to recognise this fact when contemplating any change in appearance, and not attempt to introduce change for change's sake, but only for good and substantial reasons. As an example of such reasons, one might cite the adoption of all-vitreous-enamel finish for cookers, chromium finish for kettles and automatic oven control.

Each manufacturer may be expected to adhere to his own particular style of outward appearance, but it seems reasonable to suggest on behalf of those operating hire schemes, who form the major part of the buyers, that the particular outward appearance of the various types, models and sizes should be maintained for as long a period as possible without change, and change should only be made when it is positively necessary or desirable.

It may be pointed out that the reasons put forward will inevitably tend towards restricting purchases by a particular buyer to a particular maker and differences in outward appearance of different makes instead of being calculated to promote sales will have the effect of restricting the maker's market to present customers. This being so, it would appear that the market is not really a free one and thus a good case exists for the standardisation of sizes of apparatus and of the outward appearance of the various sizes.

My experience leads me to believe that a better price can be obtained by a purchaser who continues to use one make only. This is only right, for surely the customer who continues to give orders year after year is entitled to a better price than one who changes from maker to maker at frequent intervals.

Standardisation is only possible if purchasers are content to take the standard product. If they insist on special requirements, standardisation is impossible. If the lowest possible cost of apparatus is to be obtained, mass production methods are essential. Special features interfere with the flow of work and increase the cost. They not only raise the price of the apparatus having the special features, but by interfering with the flow of standard goods they increase the price of the standard article. Speaking in general terms, the motor car industry realised this many years ago, and refused to interfere with the production of the standard car for the sake of special requirements, with the result that the standard car was produced at a relatively low price, and an overwhelming proportion of buyers take the maker's standard because it is better value. Special requirements can be obtained at a price, but the price does not appeal to the ordinary buyer. The inference is obvious. Manufacturers on a large scale should concentrate on their standard production and leave special requirements to be dealt with by subsidiary means.

The needs of the domestic user are now known, and it should be possible to get some agreement on such matters as the sizes, shapes and loadings of hotplates, grills, oven elements, immersion water heaters, &c., also the method of connecting them up in the apparatus. Two sizes of hotplates and two sizes of grills would cover the requirements of domestic cookers. As regards connectors, it is quite time that standard methods were agreed upon and made available. We should be aiming at providing a cooker on which replacements can be made with the least possible trouble. This necessitates interchangeability.

A great deal could be done towards standardising the sizes and methods of connecting up the essential components of domestic apparatus which eventually would ease the problems of manufacturers, the supply industry, the electrical contractor, and last but not least the consumer of electricity. For instance, every maker of immersion water heaters appears to have a different method of fixing the equipment in the hot-water tank. Surely a standard method of fixing is possible and eminently desirable.

It is not possible in the space available to deal with many details, but no contribution to the literature on this subject can avoid some reference to the urgent necessity for the standardisation of plugs and sockets. I have my house very well equipped electrically and I have changed my home four times in the last twelve years. On each occasion the whole of the plugs had to be changed; the last occasion was quite recently and I can appreciate the feelings of a consumer who comes up against this irritating necessity. The pros and cons of the plug question have been hotly debated for many years. All will agree that it is eminently desirable to have standardised plugs. Most people will agree that the fewer the sizes the better, and most people would agree that there are places in most houses where an earth connection to the apparatus is necessary though it should not be overlooked that there are many places where the practice introduces a danger.

Taking these points in the reverse order, it would appear that three-pin plugs can cover all requirements, while two-pin plugs cannot do so so long as metal is used for casings of electrical apparatus, and as hundreds of thousands of appliances with metal casings are in actual use the introduction of non-metal casings does not solve the problem. From these considerations it would appear that the standard plug must be of the three-pin type. As regards sizes, I believe that two sizes, 15-A and 5-A, will meet all normal requirements.

Then arises the type of plug, whether flat pin or round pin. There appears to be no doubt but that both types when properly made are suitable for their purpose. I have no preference for either type, but I do want to see a standard type agreed upon.

The matter is not capable of an easy solution, but it is of great importance and warrants the careful attention of all connected with the electrical industry. The obvious line of approach seems to be that representatives of the supply industry, both company and public authority, should settle which type should be standardised, and if agreement cannot be found it should be decided by Parliament itself when electricity legislation is being dealt with, or powers should be given to the Electricity Commissioners to decide. This may sound like using a sledge hammer to crack a nut, but the need for standardised plugs fully warrants extreme measures if the industry itself cannot provide the solution, which is necessary in the interests of millions of consumers.

Contractors as Retailers By R. W. Kennedy.

A powerful selling force

Is the financial advantage enjoyed by municipal supply undertakings in the sale and hire of domestic appliances unfair to contractor-retailers? The author thinks that it is; he asks for fair trading on level terms and incidentally remarks that ownership of apparatus by consumers is better business than hiring.

TO give an estimate—reasonably supported by chapter and verse—of the selling power of British installation engineers and retailers is far from easy. When the matter is considered in any detail, however, some very impressive figures emerge, and it becomes abundantly evident that the contribution made by contractors to the intensive electrical development of the country has now reached very remarkable dimensions.

Confining attention in the first place to British organised contractors it will be seen that the Electrical Contractors' Association (Incorporated) includes some 1,800 members, while the E.C.A. of Scotland now has more than 300 members. It is apparent, of course, that these 2,100 firms carry on private businesses of widely different sizes, some on a very substantial scale, but the majority fall into the medium to relatively small class. By allocating no more than a moderate average turnover to these federated firms we easily secure a very conservative estimate of some 15 or 20 million pounds per annum.

This annual turnover is achieved in providing installations and current-consuming equipment for factory, shop, office and domestic use; and to it must be added a very considerable sum to cover the trading activity of non-federated contractors and retailers, departmental stores, ironmongers and other non-specialised private traders. Then, again, if we add an estimated total of some 15 millions per annum as representing purely radio sales to this total of installation and equipment business—an all-mains radio set being a very effective current-consuming device—it becomes apparent that the grand total of electrical sales conducted through private business channels must, and does, reach a very substantial annual sum.

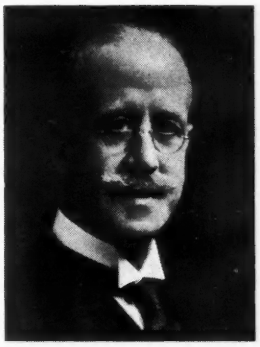
Financing Private Trade

It is well enough known that the trading company associated with the E.C.A.—namely, the National Electrical Contractors' Trading Association, Ltd.—has an effective working agreement with the United Dominions Trust (Electric), Ltd., whereby, as *quid pro quo*, the N.E.C.T.A. guarantees the hire-purchase business conducted by E.C.A. firms. The arrangements in question are, of course, of a private nature. On the other hand, the totals involved are known quantities, and it is giving away no State secret to intimate that E.C.A. business through this one finance corporation runs into many hundreds of thousands of pounds. It was this fact that prompted Mr. J. Gibson Jarvie, chairman of the United Dominions Trust, Ltd., to refer particularly at the recent annual meeting of the company to "the large amount of business done through electrical contractors" in the sale of installations and equipment.

In this direction it is at least instructive to note that E.C.A. members have recently been associated in the launching of a purely contractor finance corporation in the shape of Electrical Credit Services, Ltd. The chairman and directors of this undertaking are all contractor members of N.E.C.T.A., and the main purpose of the new company is not only to place additional credit facilities at the disposal of the E.C.A. traders, but to ensure that the profits associated with its work remain in the hands of contractors themselves and are not distributed among the non-electrical shareholders of a general finance undertaking. The N.E.C.T.A. members are well versed in the attractive facilities of such a "mutual" scheme as this, and the future of the company is distinctly promising.

From a broad point of view the trading principle embodied in the promotion of Electrical Credit Services, Ltd., has always been very strongly maintained by the E.C.A. and its allied trading organisations. The reflection does not apply directly to any finance undertaking; but, throughout its long history, the E.C.A. has been fighting all types of non-electrical "discount snatchers." It has been maintained consistently that electrical trading profits should remain, as far as possible, within the electrical industry itself—a general principle to which no reasonable individual could take exception—and it remains to be noted that this central idea is epitomised as the main feature of the industry's "Fair Trading Policy."

Reverting for a moment to what was said by Mr. Gibson Jarvie anent the "large amount of business done through electrical contractors," it is also of interest to note that a recent issue of the Commercial Supplement of the *Manchester Guardian* contained an exceptionally well-informed article on the commercial organisation of the electrical industry. Dealing with the situation from the manufacturer's point of view, the writer made particular reference to the electrical contractor as "an important channel of distribution." In this direction very illuminating reference was also made to the possibility of bulk-buying by supply authorities under McGowan amalgamations, and the *Guardian* writer remarked: "that is why manufacturers are keeping on the closest possible terms with contractors. They are the chief alternative outlet for heavier domestic electrical equipment."



Mr. R. W. Kennedy is editor of the official journal of the E.C.A.

It is outside the scope of these notes to discuss the possibility of bulk-buying on the part of organised contractors. It is possible, however, to hazard the opinion that, in the main, private retailers are not favourably impressed by the undoubted limitations, if not evils, that such bulk-buying schemes tend to set up. On the other hand, desperate diseases have been known to call for desperate remedies, and for this reason some little attention has been devoted in recent years to the obvious possibilities of bulk-buying from the organised contractors' point of view. It is apparent that service and replacements for E.C.A. standard equipments could be organised on a national basis, the scope being much wider, of course, than any amalgamated supply area.

Mention has already been made of the estimated annual sale of radio receiving equipment in this country—a figure of £15 million being quoted—and it will be found that this total is not far removed from the truth. The number of listeners may be put in the neighbourhood of 8½ million, the annual increase in recent years being roughly half a million. Allowing an average price per receiver of £10—a figure, perhaps, that is on the low side—this annual money turnover provides for half a million entirely "new" sets and a million "replacements," or one in eight. It may be thought that such a replacement rate will not be maintained in the future, that receiving sets have now achieved a higher general standard of quality and a substantially increased "life" but no matter how near these conservative figures may be to actual truth the fact remains that *all* this large business has passed through the hands of private traders who have certainly developed the radio trade and attended to the wants of radio "consumers" very effectively indeed.

Are Hire Schemes Worth While?

It is to be noted in passing that the number of homes in Britain is now put at 12 million with radio listeners and electricity consumers both at about 8½ million. It is also to be found that all the radio business referred to has been done on a cash or hire-purchase basis. It has been said that such cash sale radio development has been possible because of the "popularity and excellence of the basic public service involved"; and the detached onlooker may well be moved to wonder how soon ordinary electrical usage will become so "popular"—since it is already "excellent"—as to lend itself to development on similar *commercial* lines?

This question—a very serious one to the private contractor-retailer—permits a final reference to electrical hire-purchase business as at present carried on. It will be called to mind that the 1919 Electricity (Supply) Act gave authority to all supply undertakings to indulge in simple hire in order to meet gas competition in this particular field; and not a few tears have since been shed over the somewhat speculative manner in which a hirer tends to take care of apparatus that really belongs to somebody else.

The next supply authority trading development was provided by the 1926 Act which gave power to *sell* equipment at "list price," and it must be agreed that supply undertakings, on the whole, do in fact observe this "list price" condition with commendable determination. This fact is proved by the small amount of work that has fallen to the lot of the Statutory Committee set up by the 1926 Act to determine, *inter alia*, any "list price" difficulty that might arise. So far as I am

Installations in New Houses

By Major P. A. Smith, O.B.E.

Relationships between the electrical contractor, the consulting engineer, the architect and the builder

Wykeham Studios

Major P. A. Smith, O.B.E., A.M.I.E.E., is chief engineer and managing director of Drake & Gorham, Ltd.

THE electrical contractor is faced with many problems which must be solved between the time that he is invited to submit an estimate for a new installation and the final settling of his account for the completed work. In the first place, the inquiry may come from one or more of the following :—(a) the client, (b) the consulting engineer, (c) the architect, or (d) the builder. The order may be placed by the client direct, or by the consulting engineer or architect on behalf of the client, or by the builder as a sub-contract to his own main contract with the client. The first three cases are the usual procedure with small contracts or where the installation is required for an existing building, and the last arrangement, through the building contractor, is the almost invariable practice where electrical installations for new buildings are concerned.

The Client.—Very much or nothing at all need be said about the actual client—suffice to say that he varies in every possible way and success depends largely upon whether the contractor is a good judge of human nature or not. The golden rule is to give the client the impression that he is the contractor's only important concern and that everything he requires is receiving personal attention from someone in authority known to him. Nothing annoys a client more than to have his often petty queries dealt with in a stereotyped manner, such as to be told that they are "receiving attention," when he wants information.

A new installation should be right from the start. This necessitates the co-operation of the electrical contractor with the client and those acting for him. The author deals with the relationships between the parties concerned and indicates how harmony can be preserved and the client satisfied.

The Consulting Engineer.—From the reputable contractor's point of view, there is no question but that the ideal way of carrying out all classes of electrical contracting is in collaboration with a consulting engineer having practical experience as well as theoretical knowledge of the work which he specifies.

In the first place all the electrical contractors tender to one specification and they trust the consulting engineer to give unbiased advice to his client as to the tender he should accept. Then, during the progress of the work, both the client and the electrical contractor expect to have an unbiased technical adviser to decide all points as to variations in the contract prices for extras or unforeseen delays in the execution of the work. And finally, when the work is finished, the consulting engineer acts as the arbitrator on the satisfactory completion of the installation and the settling of the account.

The argument often raised against employing a consulting engineer so as to save the client the extra cost of his fees would completely fall to the ground if electrical contractors would unanimously insist on his employment. If this could be achieved, then the electrical contractor's establishment charges and correspondingly his estimates, would be greatly reduced due to the saving he would be able to make in the preparation of specifications, drawings and supervision, which should more than counterbalance the consultant's fees and at the same time ensure a greater uniformity and higher class of work throughout the installation industry.

The Architect.—Where an architect is employed, it is essential that the closest co-operation should exist between him and the electrical contractor. When the work is being carried out under a consulting engineer, this co-operation is usually effected through him as an intermediary, and in such conditions it is better for the contractor to employ this channel rather than try to deal direct with both parties at the same time, which generally leads to misunderstandings.

In many contracts, however, the electrical contractor must deal only with the architect, as no consulting engineer is employed. A closer and more personal co-operation is then necessary, for the contractor must, to a large extent, take the place of the consultant. In many cases he is supplied with a set of blueprints or drawings, blank from an electrical point of view except perhaps for a few pencilled notes, or a brief specification stating the architect's or his client's requirements. From these drawings and particulars, he must prepare, at his own expense and without any certainty of getting the contract, the illuminating and heating intensities required, the numbers and positions of lighting, heating and power points and switches, the schedules and loadings and general distribution scheme, before he can commence to get out his "competitive" estimate.

He generally gets all the information he requires as to the particular requirements of his client, and should he be successful in securing the contract, the architect usually co-operates satisfactorily with him in the selection of fittings and the decorative scheme generally, but the contractor sometimes finds himself in difficulties in the provision of a suitable switchroom and cases or ducts for the rising mains, etc., and he misses the help that he would otherwise obtain from the consulting engineer who would insist on and make provision for such contingencies.

It may be asked why the electrical contractor is always willing to do what virtually amounts to consulting engineer's work at his own expense, even before he secures the contract. The answer is that were he "conscientiously" to refuse to do this work it would simply mean that he would probably lose the particular architect's connection as well as the order, with the certain knowledge that there would be plenty of other reputable electrical contractors ready and willing to take on the prospective contract on these lines. On the other hand, it may be taken for granted that the majority of the leading electrical contractors would gladly forego the "pleasure" and expense of doing what should be the consulting engineer's work if only they could be sure that they would receive wholehearted support from other contractors and that the architect or the client would be compelled to employ a consultant to do this work.

A quantity surveyor is generally employed by the architect on the larger type of building, but he frequently does his own surveying where small buildings or private houses are concerned. The electrical contractor must keep in close touch with the quantity surveyor when one is engaged on a contract, especially when the work is nearing completion, as the contractor's charges for "measured runs," extras and variations must be agreed by him before his account can be passed. It is also always advisable to agree to the methods of charging and other details with the surveyor before the work is commenced, even where a consultant's or architect's specification and conditions of contract provide for the terms of payment.

The Builder.—The relationship and co-operation between the electrical contractor and the building contractor are gen-

Contractors as Retailers

(Continued from preceding page)

aware, the Committee has met only on the rarest occasions, for the simple reason that very few list price disputes have arisen.

On the other hand, while the list price is maintained with the greatest ease so far as cash sales are concerned, the contractor-retailer rightly complains of his inability to compete with the hire-purchase terms arranged by many supply authorities. While maintaining the list price of the article, the supply authority has cheap money resources at its command that are not open to ordinary commercial traders, with the obvious consequence that supply authority hire-purchase terms are seen to be extremely "easy" when placed alongside normal or commercial hire-purchase terms.

And so we come to one of the most interesting problems of the moment. In the letter and spirit of the 1926 Act, does not the hire-purchase price of an article involve two *commercial* factors, namely (1) the *list price* of the article, and (2) the *list terms* of an ordinary commercial finance company? To answer this question in the affirmative would be to place all electrical retail business on the same basis. Standard hire-purchase terms would be available from all sources—from the supply authority, from the manufacturer who makes his own hire-purchase arrangements through the trade, and from the contractor-retailer alike. The whole question comes back to *Fair Trading* which must, surely, be based on normal and reasonable *commercial* usage

erally very satisfactory as their interests are to a large extent common and as a rule the "wheels run smoother" where one is sub-contractor to the other, as the builder in getting his legitimate 2½ per cent. discount is financially interested to a small extent in the electrical contractor's work.

An essential feature in the carrying out of a contract is to ensure that the electrical contractor's engineer and foreman work amicably with the builder's manager and general foreman, and where there is likely to be friction or misunderstandings action must be taken in the early stages of the contract to put the matter right. The only serious "grouse" that the electrical contractor has against the building trade in general is where he has to compete against a builder who has an electrical department of his own and where there is a suspicion that the 2½ per cent. builder's discount as well as the builder's p.c. sum for "cutting away and making good" will be used against him by the builder to secure the order for his electrical department.

Taken as a whole, the co-operation between the consultant, the architect, the builder and the electrical contractor is on quite a satisfactory basis at present and is very much better than it used to be before the Electrical Contractors' Association pressed for the recognition of its members' rights by the other parties concerned. The consulting engineer can now be depended upon to support the *bona fide* electrical contractor and to appreciate the necessity of ensuring that his rights are safeguarded in the terms and conditions under which a contract is placed and carried out.

The position as regards the architect is still somewhat difficult so far as the terms and conditions of a contract are concerned, as he does not always support the electrical contractor and observe the terms of the Fair Trading Policy. This particularly applies to p.c. sums covering the supply of fittings and portable appliances, where it will sometimes happen that the architect obtains competitive net trade terms from the fittings manufacturers and then places the order on behalf of his client with the electrical contractor at these net prices allowing sometimes a profit of only 2½ per cent. This is immediately taken by the main building contractor in the case of an electrical sub-contract, with the result that the electrical contractor stands to get nothing on the fittings he has to handle except for the doubtful profit he may secure for the erection. The fittings manufacturers are largely to blame for this state of affairs and it is to be hoped that in the not too far distant future they in their turn will give full support to the electrical contractor when they are quoting architects direct.

It would also be helpful and more uniform if architects, when operating without a consultant, could specify that the work was to be carried out in compliance with the terms and conditions of the Model Specification issued by the Institution of Electrical Engineers and that where a sub-contract was concerned, the form of agreement as issued and approved by the National Federation of Specialists and Sub-Contractors was to be used. This sub-contract agreement form is now adopted by most of the leading building contractors and has taken the place of the old and unsatisfactory sub-contract form issued by the Institute of Builders.

Consumers' Grouses

From One of Them

The author thinks that supply authorities could profitably help prospective and actual consumers more than they do, particularly by advising them in the planning of installations and by rendering prompter service

THE London electricity supply companies do not always give that quality of service to domestic consumers, actual and potential, which might be reasonably expected, considering the solicitous attentions of the gas companies with which they are in competition. The following examples are actual experiences in London suburbs served by two of the largest companies.

The average domestic consumer desiring to have electric lighting, &c., is not in a position to employ a consultant; he might reasonably expect that the company, knowing his intentions, would send a man competent to advise on such matters as the most convenient switch positions; the relative cost of doing the work in one way or another; what can or cannot be done; in fact, to act as the consumer's consultant for the job with the object of making it a permanently satisfactory one. Experience is that the men sent to do this preliminary work (it may be the first contact between the prospective consumer and the company) are frequently devoid of any technical knowledge or able to do more than count the number of rooms, and note the consumer's notions of the number and positions of lamps and kind of fittings. From their report the company makes out a tender, the consumer accepts it and signs an agreement for supply.

Inconvenient Wiring

The next step is the arrival of the wiring team; they have no instructions beyond the bare number of points; they know nothing of the previous interview; the consumer (generally a busy housewife) has to go round the house with the wireman and again settle the positions of lamps, switches, outlets, &c., with very little help from that expert in respect of convenience of use. Little regard to appearance is shown by the wiremen, conduit is run across ceiling and down walls in full view, unless the lady of the house protests in time, happening to know from her own or others' experiences that perfectly good concealed routes are available. Again, outlets for fires, portable lamps, &c., are always put on the skirting board unless the consumer insists that they shall be put at a conveniently accessible height; a wireman has been known to reply to such a request that he has never heard of the like, and does not know whether it can be done! There is never any suggestion from the wireman that it would be convenient to leave the wiring easily capable of extension to, or of being fitted with, additional outlets.

One might expect that the company would make it a routine practice to put outlets for fires into every living and bedroom; and for a cooker and a water heater where such appliances could be conveniently placed, even though the consumer had not at the time decided to install them. There is very little extra cost in providing for additional appliances. The wireman asked by the consumer to put in some additional outlet for possible future use is apt to be deeply shocked by the audacity of the idea. The net result of the procedure is that the consumer—unless unusually knowing—is left with an installation which is not very convenient in certain respects, may not be quite sightly, and is decidedly unsuitable for easy extension. And it is not cheaper than if done by an average tradesman contractor who would have possibly been more liberal with advice. There is nothing to complain about as to the quality of the materials used by the companies' wiremen, however.

The companies' showroom staffs are not very helpful in the way of advice to consumers wishing to purchase fires, kettles, &c., and replacement elements are not stocked; a customer may have to wait a week in winter for a new firebar, iron or toaster heating element; or he may be told that the element wanted is "out of date." Repairs to customers' own appliances are charged for at what seem to be exorbitant rates. These complaints do not apply in general to appliances hired to the consumer, but the service is frequently less prompt than might be expected.

The Example of Gas

From the beginning the representatives of the company with whom the consumer makes direct contact do not impress him (or more frequently her) with that eagerness to serve and help essential to good relations. The contrast with their opposite numbers employed by the gas companies is great. With them the domestic consumer is a person to be helped and advised; perhaps the contrast is strongest with respect to the showroom staffs. The gas showroom has always someone who is an expert in each class of appliance, who tries to understand what exactly the customer wants to do, can say what will best serve that end, and how it should be used. They usually carry good stocks of replacement parts, and often can do minor repairs on the premises.

Anyone moving among domestic consumers in suburbs served by certain London companies—such as bakers' and dairy roundsmen—hears many and bitter complaints on these matters from the housewives; not at all good advertisement. There is great room for improvement in these branches of the company organisations.

Large American Steam Plant

The largest steam-operated generating plant ordered by the American electrical industry since 1931 is to be built for the Central New York Power Corporation, a subsidiary of the Niagara-Hudson Power Corporation, states *Reuter's Trade Service* from New York. The turbo-generator will be built by the American General Electric Co., and the boiler plant by the Babcock & Wilcox Co. The equipment will be erected at a new station and the complete plant will cost about £1,900,000. It will be one of the most efficient steam stations in the world, and is expected under full load to produce a kWh for every 0.85 lb. of coal burned.

The Radio Installation. By Frank Boyce, M.I.W.T.

"A WIRELESS set is a musical instrument and its proper retail channel will be through the showrooms and shops of music dealers." That was the opinion expressed by some knowledgeable people in the trade about ten years ago, and I must admit that I did not contradict anyone holding that view. But the increase in the number of radio stations throughout the world tending to crowd the ether, and the rapid technical developments in valves, circuits, and components, has forced us back to the truth that a wireless receiver is *not* a musical instrument, and this is no veiled criticism of the quality of reproduction sometimes heard.

A radio receiver or radio-gramophone is, in fact, part of a means of communication between the concert hall, the racecourse, or the boxing ring, etc., and the listener. The better the receiver the less will it add to or subtract from what it conveys. A musician does not play on it; it simply conveys the music he produces from a genuine musical instrument and it does so electrically; it is an electrical appliance. It is the most popular electrical device of all domestic appliances and is often, apart from lamps, the *only* electrical appliance to be found in many houses and flats. As an appliance it comes directly within the scope of the electrical contractor who, by making and taking opportunities, can widen his field by selling sets and installing them.

Opportunities for contractor-dealers

Too little attention has been given to *suitability* and *installation*, and who should be in a better position to find out what is required by a listener than the contractor who attends to the listener's wiring. It is not enough to let a purchaser choose a set himself from an array in a showroom, because satisfactory reception depends upon the proposed position of the instrument and the local electrical arrangements. There are thousands of listeners using sets unsuited to their particular surroundings, and receiving programmes marred by noises under the impression that radio must always be like that.

Earlier experiences should not scare the electrical contractor away from the radio business. Receiving sets are as much domestic electrical appliances as fires and cookers and should be handled by the electrical industry.

Dealing first with the instruments themselves, contractors are, of course, generally interested in them although in some cases, sales experience has not been a happy one. Fortunately, it is a field in which the contractor does not meet the sometimes inconvenient competition of the supply authorities. There is, too, no need to-day to carry a large stock of different makes. An agency for a nationally known radio firm can be taken up with a moderate stock which should turn over reasonably quickly if any effort at all is made to recommend and sell it. Even this step is not essential, for satisfactory receivers can be obtained from factors and wholesalers as and when required.

No Hire-purchase Worries

The worry of hire purchase is, to-day, taken on by the manufacturers themselves or by finance companies. In a few cases manufacturers provide a "non-recourse" system under which the contractor suffers no financial loss in the event of default by the hirer, nor would he have on his hands an old, obsolete set because it would be "re-possessed" direct by the manufacturer or finance company.

The question of service after sale is bound to crop up. Indeed it is at this fence that many contractors have shied, or even come to grief, before. But modern receivers of repute do not require much attention, and if service *is* required the contractor can come to an arrangement with local trade service engineers. There are many large and small firms who do nothing else but collect from, repair for, and redeliver receivers to, contractors at reasonable charges.

From the wireless trade figures available we must assume roughly that every home has, at least, one wireless receiver already. The first step then, is to take an observant interest in the apparatus used in the houses visited. Long experience, and tens of thousands of contacts with members of the public has taught me that the listener who "does not use the wireless very much," "only listens to the news," or thinks the "programmes are poor," does so because there is something wrong, and by that I do not mean a fault in the receiver. A surprising number of listeners change their opinion of radio reception altogether when they come into possession of a *suitable* receiver.

When the listener says he "only listens to the news," or that the "programmes are poor," ask him "Why?", and mark the different interesting answers, often denoting that no guidance has been given him in the choice of an instrument. You will find an Irishman in London trying to receive Athlone on a transportable receiver which could not pick up a station at that distance anyway; a man whose sole interest is in plays or talks attempting to get them through abominable electrical interference; a sensitive musician whose first requirement is, obviously, quality of reproduction, using a multi-valve superhet with high selectivity and all "boominess." There are, of course, many other examples of unsuitability, all of which lead the listener erroneously to condemn broadcasting.

One contractor I know opens up the matter admirably from the supply angle by pointing out, as he often is compelled to do, how dangerous it is to have a piece of worn flex hanging from a lampholder, often trailing across a carpet, and to make matters worse, the current controlled by the switch in the wireless receiver. (I have seen myself, a live flex like this catch fire.) He goes on to suggest a properly installed plug-point behind or below the set, and then, without any further pressure the owner brings out his statement about the "poor programmes," or the news value only, to justify his neglect in making a satisfactory connection to the mains supply. From this point it is a comparatively easy step to his grievances from which emerges the reason for unsuitability in his case.

Then the discussion is directed to what is really required in the way of range, quality of reproduction, or absence of background noises, and eventually an arrangement is made for a demonstration of a receiver calculated to satisfy his wants, seldom without a successful sale.

Sometimes it is impossible to give a prospect what he requires. For example, a flat-dweller, prohibited from putting up a useful outside aerial, wanted to use a transportable receiver (with its own frame aerial internally), to receive satisfactory results at full programme value from Continental stations, through local interference from lifts and other electrical devices that created a perpetual roar from the loudspeaker. This was a case that the contractor was wise to leave alone, but in mentioning it I am reminded of another source of profit—from the suppression of noise.

Interference Suppression

This side of wireless reception is most important yet profitable opportunities are lost because so many people believe, as I have said above, that reception is inevitably accompanied by crackling and popping noises. In industrial areas, or large towns, the suppression of noise is far too large a proposition for the contractor to tackle, but there are many listeners in country towns whose reception can be improved substantially by the knowledgeable contractor.

In many old houses, wired long ago with lead covered cables years after they were built, it is impossible to listen to a modern sensitive receiver or radio-gramophone with any degree of comfort. In one house in which I lived for some time, any vibration caused by a heavy person walking about upstairs or by traffic in the street set up violent crackling noises from the loudspeaker. An investigation proved that many of the switches were in the *earthed* side of the mains supply and the sheathing was not properly bonded to earth in inaccessible places. Since I was not staying long, I avoided the expense of overhauling the wiring and had an anti-interference aerial fitted at the bottom of the garden, with a low impedance line buried under the garden path on its way to the house. The gear is the standard anti-interference aerial system marketed by well-known manufacturers who are specialists in this line. Additional suppressors were applied to the mains feeding the instrument, and the overall result was striking. Where it was a painful business listening to the news before, it became a joy to listen to a long play with a perfectly silent background.

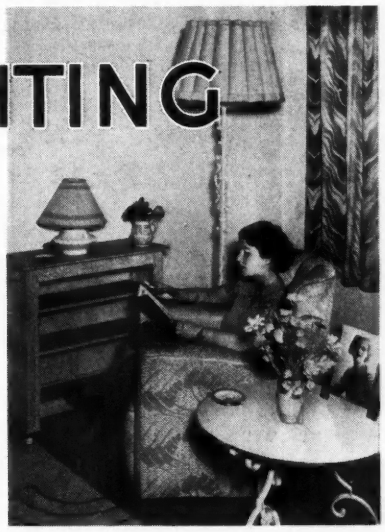
The electrical contractor is able to advise in these matters of electrical interference and to supply and fit the suppressors necessary to ensure quiet reception. Summing up, he is indeed in a strong position to make the sale and installation of radio receivers a successful sideline.

Manchester and Trolley-buses

The authorities in a number of towns where trolley-buses are used have been approached by Manchester with a request for information on the cost of operation and revenue. Later on members of the City Council are likely to visit several of the towns. These steps are part of the investigations upon which the City Council will next January base its choice between trolley- and oil-buses.

Better Lighting

Ideas which contribute towards the trend of development of equipment



ATTEMPTS to classify lighting fittings and equipment always fascinate, first because one is amazed at the immense possible number of divisions, and secondly because of the great degree of unavoidable overlapping between the divisions. Who would dare to say that an architectural fitting is not decorative, or that a utility fitting had no "architecture in design"? Yet in spite of such great overlapping classification is helpful, and in the following notes we shall endeavour to direct attention to three main groups of equipment—that in which the essential qualification is decorative effect, that in which architectural considerations outweigh others, and, thirdly, the utility class of equipment.

The simple shade was the earliest form of decorative lighting fitting, and it is one of, if not the most popular. To point to a few representatives of different types there are the tinted decorated parchment and "Rhodoid" shade with a 4-in. silk fringe of Lighting Trades, Ltd., the new specially treated real skin shades in various shapes and shades from old deeds with genuine seals produced by the Belgrave Electric Co., Ltd., the eight-sided unit of the Osborn Manufacturing Co., Ltd., with clear "Celastoid" sides and silk fabric "Cellophane" corner pieces, and the tinted "Translucent" moulded shades listed by Ward & Goldstone, Ltd.

The nursery offers endless opportunities for the shade designer and the "Snow White" lights of British Thomson-Houston Co., Ltd., introduce a topical note. They are made up as a 12-lamp set complete with accessories.

New artistic bedlights by Electric Art Shades (1928), Ltd., are each fitted with a reflector back and wired ready for use. The "Litlux" of Dernier & Hamlyn, Ltd., sits on the bed rail. A notably decorative bedlight is that by Drake & Gorham Wholesale, Ltd., of "Shellcrest Lumex," with embossed Adam design.

Lounge and dining room laylighting (G.V.D. Illuminators)

It is a short step from the shade to the shade pendant for, say, hall or bedroom, such as the unit of Falk, Stadelmann & Co., Ltd., with antique brass finish with old ivory relief and a shade proper of "Colloid" material with brown design and shading and beige ribbon velvet edging. Then, of course, the two-light dressing room pendant is essentially a shade unit, and an F.S. fitting has 4¾-in. square shades of natural opal "Celastoid."

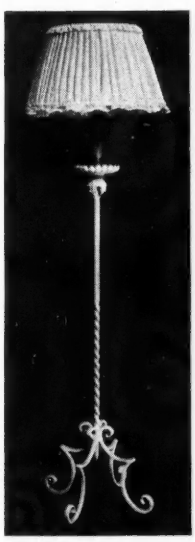
The multi-light fitting is still a great favourite as decorative equipment, whether of the fabric-, moulded- or glass-shade type. The four-light F709 fitting by Troughton & Young, Ltd., has "Celastoid" shades bound with velvet and a distinctive note is given by the silk-covered suspension cord with a silk tassel. What appeals to us about the "No. 9477" three-light unit of T. B. Morley & Co., Ltd., is the dignity imparted to three simple bell shades by the sweeping arms. The spread is 18 in. overall.

An unusual fitting for a large dining room is the "Canrowth" of the General Electric Co., Ltd., which has five units all in a line. The faceted peach mirror stem of fitting, "No. 35523," of Best & Lloyd, Ltd., is a truly "light-decoration" subject, and the massive suspension chain contrasts pleasingly with the slender wide-mouth shades. The charm of the "BE 3144" fitting of Berry's Electric, Ltd., lies largely in the central ring through which the spider arms for the shade units are threaded. A magnificent example of clear crystal glass work is the "4825 A" five-light pendant of Dernier & Hamyln. The units are bracketed from a heavy centre piece under a huge tassel. A six-light fitting by L. G. Hawkins & Co., Ltd., has rose or champagne glassware with silver finish metalwork and an adjustable glass ball.

The "No. 344" pendant of National Lighting Co., Ltd., is as unusual for its four-chain suspension as for its two-shade assembly on a square "frame" which gives it a distinctive appearance.

A new note is the "corrugated" glass shades on such fittings as the "No. 715" of Renown Electric, Ltd. Rose, champagne and green glass, with antique brass and chromium plate is the choice. Simplicity is the beauty of the "No. 601" three-light pendant of Walker Fender Co., Ltd.

The bowl or semi-indirect lighting fitting provides never-ending opportunities for decoration. A fine example is the "E 9559" unit by Wholesale Fittings Co., Ltd. It has a 16-in. diameter satin rimpled glass bowl with an ornamental crystal edge and a 20-in. diameter satin halo disc with an etched ray design. The feature of the Best & Lloyd No. 35135 is the obscured reeded glass cylinder surmounting the opal "convex." Cellulosed in two colours, the "AF 531" two-tier pendant of W. N. Froy & Sons, Ltd., is fitted with five 3-in. and one 9-in. lens bowls and glazed and sandblasted glass strips. The "No. 180" new design of semi-indirect fitting by S. Guiterman & Co., Ltd., has side louvres floodlit from below.



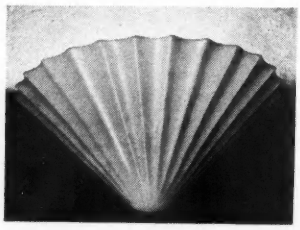
Parks wrought-iron floor standard

A contrast to the modern shallow bowl is the Morley three-light 16-in. deep bowl in blue, amber or pink with chrome, polished copper or satin silver or copper finish. The method of suspension is often an essential decoration feature and some "Supreme" glass fittings of indirect type are characterised by pink silken cords and tassels.

The combined bowl and multi-unit fitting appears to be obtaining a footing in the market, and one excellent scheme is bracketing the "units" directly on to the bowl itself, such as in the "F 3844" equipment of Drake & Gorham Wholesale, Ltd., while in the case of a Best & Lloyd equipment the metal bases of the "units" are strapped to the metal cylinder. The "AF 532" Froy product is cellulosed in two colours and fitted with five 3-in. and one 9-in. bowls, and is glazed with white or tinted, sandblasted glass strips.

From the halo fittings, of which we have seen a good deal in the past two years, have been developed a whole range of what may be termed "cylinders and circles" equipment. The Wholesale Fittings Co.'s "E 6612" has a 10-in. "Opaline" cylinder and a 17-in. disc with a clear edge. The "998" unit of Electrical Components, Ltd., has two frosted glass cylinders and three circles with clear borders. The Morley "9479" has a disc surrounding the central bowl. The

"L 87778" of Falk, Stadelmann & Co., Ltd., replaces the cylinder by a sphere which it surmounts, while the sphere of the "292" fitting of the Osborn Manufacturing Co., Ltd., is centrally suspended within the disc. The Froy "AF 535" is all discs, and the "DP 141" of Hailwood & Ackroyd, Ltd., is all cylinders—one fitted centrally and five outside.



Troughton & Young "architectural" wall unit

Architectural lighting is talked about increasingly, but it has a variety of meanings. The architectural (tube) lamp contributes to the idea when it is used for lining or "picking out" building features; various forms of concealed lighting merely illuminate special features and show them to advantage; built-in equipment often carries the distinction solely on the score of its incorporation; many fittings are claimed to be architectural because of their special design to match architectural features (in period rooms, for instance); and then the term "architectural" is used in actual reference to the design of equipment itself. Some effort to clarify this position would be welcomed by all concerned with electric lighting development.

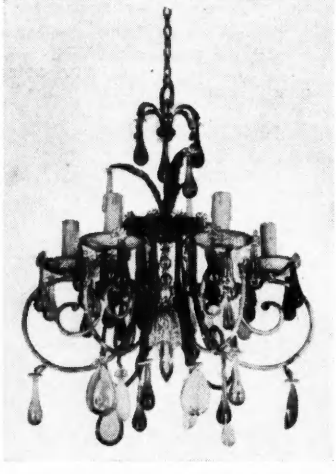
No source of illumination is less glaring or more adaptable than the architectural lamp, says the G.E.C. White, opal or three-ply coloured glass lamps are available in a wide range of straight and curved lengths. Straight-Lite Reflectors, Ltd., state that the "Super Straight-Lite" reflector incorporating the "Maxtrip" lamp is making further progress in connection with concealed lighting from cornices. As against concealed cornice lighting there are "Straight-Lite" illuminated cornices. The closed type consists of a decorated metal frame fitted with curved glasses. An open cover unit is similar.

Concealed lighting units by Corbelux, Ltd., can be installed to fit any design of architecture and circles as small as 20 in. in diameter can be formed. The adaptability of the tube lamp is illustrated by such fittings as the "M 550" pendant of Tucker & Edgar, which has two tube lamps disposed horizontally between sand-blasted glass half-discs, and the one-, two- and three-lamp wall units of Straight-Lite.

The tube lamp in a well designed trough reflector is an excellent architectural feature or picture illuminator. The "F 747" unit of Troughton & Young takes a 11⅞-in. "Maxtrip," is 15 in. long and has a 2½-in. projection. It is finished in anodised aluminium. The "Model A" picture lighting unit made by Linealux, Ltd., has a matt silvered reflecting surface which avoids glare and striations. The picture unit of Linolite, Ltd., has an arm with projections up to 15 in. and it is readily adjustable. Spotlighting, of course, is an ideal way of illuminating local features, and an equipment recently introduced by Whiteway Lighting, Ltd., consists of an arrangement of lenses in combination with a 30-V gasfilled lamp, complete with transformer or resistance. The apparatus projects a beam of light through a hole in the ceiling.

Osborn pottery table lamp

From the incorporated-equipment aspect laylighting represents one of the outstanding examples of architectural lighting. G.V.D. Illuminators have recently developed their system in the domestic field, and we illustrate a novel installation at Kingston. The scheme provides normal lounge and dining room lighting and special effects when the partition doors are open and the larger room is used for dancing. There are two laylights in the lounge and one in the dining room. For normal use there are in each laylight clear and tinted orange lamps. The flush electrical fittings of Downham & Co. each have a bevelled mirror faced with frosted transparent "inset." An 11¼-in. "Striplite" is housed in a strong ply recessed box.



A wrought-iron and crystal fitting (Belgrave)

We should say that wrought-iron fittings have as big a claim as any to be termed "architectural." A very fine example of wrought-iron work is the "No. 2013" bowl unit produced by Hyders. The bowl proper rests in a cradle with some attractive scrolling, and the scheme is "supported" by the heavy suspension chains. F. & R. G. Parks (Lampshades), Ltd., specialise in this class of lighting equipment, and two good examples of their work are a two-unit bracket with "candles" and shades, and a dignified table standard with just a few simple scrolls and two "crystals." The Belgrave Electric Co., Ltd., says that developments during the past year have been most noticeable in painted wrought-iron fittings. Their "No. 1" pendant with five candles has an extraordinary amount of ironwork in it as well as many drops. A feature of the two-light "Baguette" bracket is the fine leafwork in metal.

In the right hands much can be done with woodwork, too, and we have seen some fine examples of oak fittings designed especially to suit room panelling, furniture, and so on. The "No. 1930 Oaklite" produced by S. Guiterman & Co., Ltd., has three pearl finish glass shades seated on an oak spider suspended from a c.p. metal column. The oak is beautifully french polished. The four fabric shades of "No. 911 Renown" are suspended from the oak arms splayed upwards from a chain-suspended short oak column.

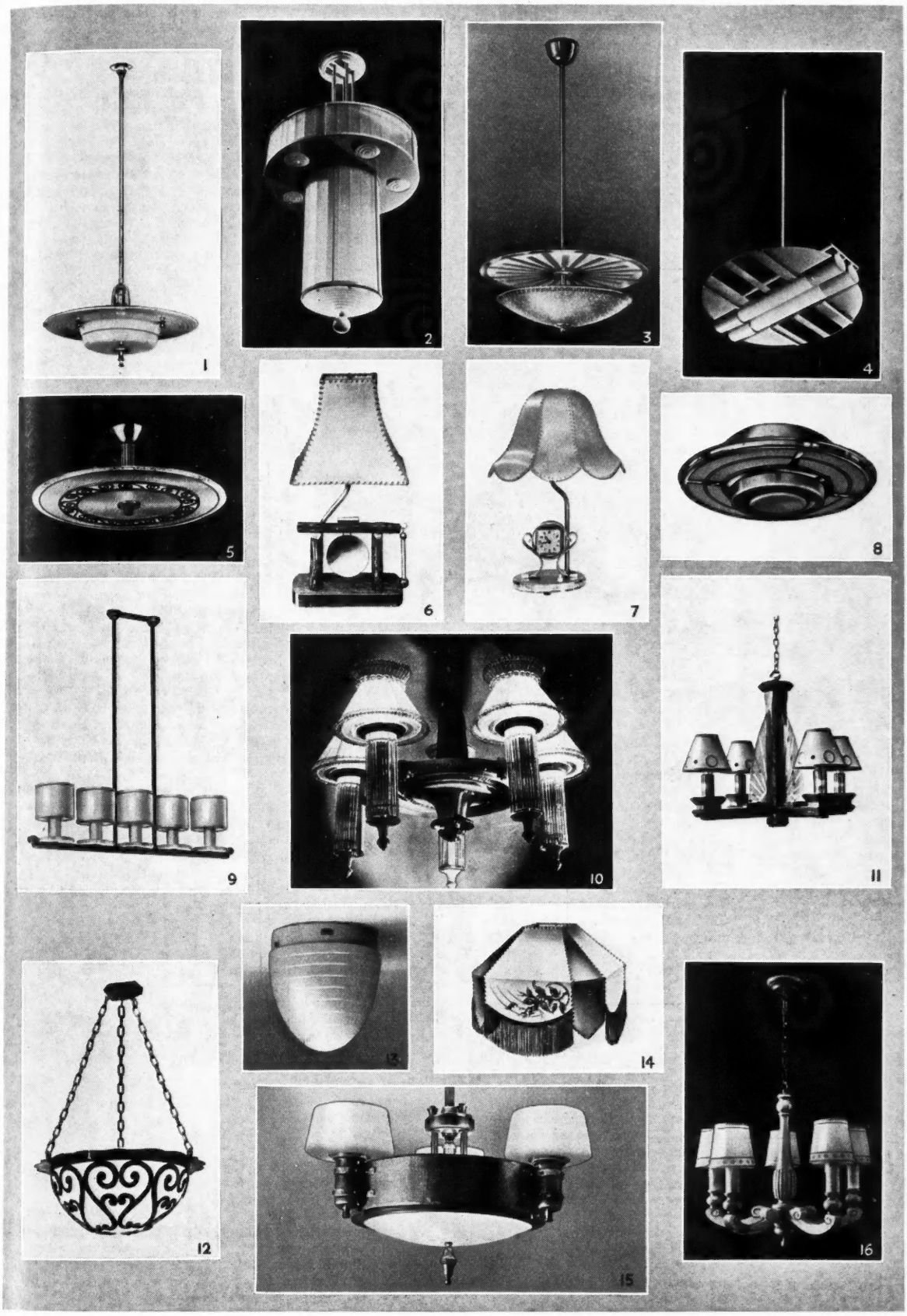
Among built-up panel fittings the Hawkins "Finray" models are notable. An outstanding example is the "3086A" four-vane pendant with telescopic suspension. The four vanes are in the form of thick glass discs vertically disposed around an inverted conical "bowl." Perhaps the last word in panelled fittings is represented by the "Castle" mirror-glass units produced by the Euston Manufacturing Co., Ltd. Designs and colour combinations are produced by photographic methods on sheet glass additional to that of the fitting proper, thus the decoration can be changed. The "Sotobed" standards of Cooper & Smith form a realistic reproduction of candles.

The wall bracket may be all that the suspended fitting is from the decoration and design angles, but we feel that it has a special claim from the architectural aspect, if only by its very intimacy with the building. An example of a modern panelled bracket fitting is the "L87899" unit by Falk, Stadelmann. Of box-type structure it has champagne side panels and an 11-in. diameter disc front with a clear edge. In the "F3808" bracket by Drake & Gorham the metal work is invisible and there are three semi-cylindrical obscured glasses and a top halo. The "F738" Troughton & Young wall unit with its simple open-fan shade cupped direct to the wall is a good instance of the "architectural bracket," particularly because of the material of which it is constructed—Poole pottery.

Of course, from the "architectural lighting" point of view the wall unit is essentially a local lighting unit, but there is a tendency in some quarters to use the bracket for general lighting like the similar move with the floor standard a year or so ago. But the popularity of the floor standard as a local lighting unit is greater than ever, and as one lighting-equipment manufacturer put it, it is a reliable trade barometer—one of the first luxuries the householder indulges in in time of prosperity. The "Dualite" floor standard of Dernier & Hamlyn is designed for both general and local lighting. The stem is adjustable in height and the shade is instantly reversible from the inverted indirect lighting bowl position to that of a reading lamp shade. The Best & Lloyd "No. 34794" equipment is adjustable to afford both direct and indirect lighting, and its elegance and simplicity suggest use particularly where there are delicate furnishings. It has a "thonged" shell shade and a metal reflector. The forceful design of G.E.C. iron floor standard "F10826" places it in the "architectural" field.

Balancing table lamp; Perry Bevan

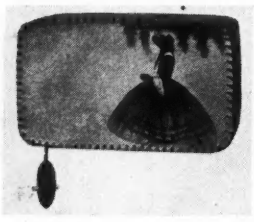
Maybe the table standard is even more popular as a local lighting unit than the floor unit, and we have been most impressed by the appeal of pottery table lamps. The "Saturn," of Shelley Potteries, Ltd., has a tall cylindrical base in step formation.



A variety of modern lighting fittings

1. A "cylinder and circle" fitting (Morley). 2. Froy multi-lens bowl unit. 3. Disc design (Wholesale Fittings Co.). 4. Tubular lamp pendant (Tucker & Edgar). 5. Shallow bowl fitting (Berry's Electric). 6. The "Gong" (Maurice Bobin). 7. Clock table lamp (Walker Fender Co.). 8. Panel ceiling fitting (McGeoch). 9. "Renown" multi-unit wood fitting. 10. Design in crystal glass (Dernier & Hamyln). 11. A G.E.C. multi-unit fitting. 12. Example of wrought-iron work (Hyders). 13. Zeiss-Ikon controlled-lighting unit. 14. Fringed parchment fitting (Lighting Trades). 15. Combined bowl and units (Best & Lloyd). 16. Oak candle fitting (Falk, Stadelmann).

hand-painted in pastel shades of green and ivory to brown foot. The ivory tinted shade has pale brown bands to match the stand. We selected the "F9002" unit from the Siemens range for illustration because of the boldness of the base. It is Staffordshire pottery with decorative colours on beige. The hand-painted parchment shade matches. The tree - decorated "old jug" stand of the Osborn "342/98" table lamp is charming; it has a plain parchment shade with a simple silk fringe.

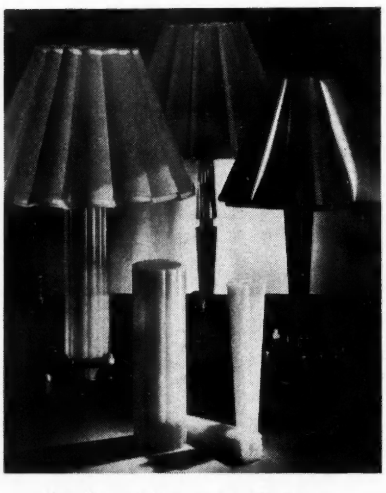


Bed-head fitting (Electric Art Shades)

The statuette table lamp is a fruitful field of exploration for the decorative-lighting engineer, particularly where the concealed lighting source puts "life" into the figures. The Hawkins "LGH831" has two figures against a background of moulded "Opaline" glass on a black base. The effect is striking. Incorporating a clock in the table lamp is another idea which has had considerable success. In the Walker Fender Co.'s "330" table lamp the clock is nested in some interesting scroll-work.

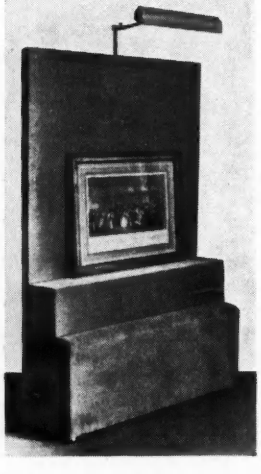
Attractive use of fins and crystal "drops" (Drake & Gorham)

One of the many novelties encountered in the table-lamp world is the "Gong" by Maurice Bobin. The metal dinner gong and the "Erinoid" striker hang from a rustic wood structure on a solid mahogany base. Catalin, Ltd., supply stem castings to the lamp manufacturer, and with the shades matching the stems very attractive outfits result. A balancing table lamp has been introduced by Perry, Bevan & Co., Ltd. It has a weighted base with a rounded bottom and cannot be upset.



Catalin castings and table lamps

The term "utility" is generally applied where lighting efficiency and even distribution are the principal aims. What better light diffusion can one have than that applied indirectly where there are suitable reflecting surfaces. But some indirect lighting equipment is certainly among the most attractive. The Falk Stadelmann "L87908" unit, for instance, has two cast-brass inverted troughs held centrally in stirrups hung from a heavy square "drop." The Drake & Gorham "Edge-Ray" fittings are specially designed for indirect lighting, but the effect of the edge reflector ring encircling the outer edge of the "bowl" is to redirect light on to the polished bands and aluminium of the outside surface.



Whiteway picture-lighting scheme

But perhaps the term "utility lighting" is most truly applied to the fittings specially designed to control the direction of light projection. The "Benflux" equipment of the Benjamin Electric, Ltd., has an interior opal glass diffusing reflector and a top metal reflector with large apertures near its centre. While most of the light is reflected on to the work where it is wanted, some passes through the opal shade via the apertures, in the top reflector. The "No. 150" table lamp of J. Toubkin has two reflectors — an inner one inverted under a larger one, so that indirect lighting results from that reflected from the bottom reflector and the light that is diffused by the top one.

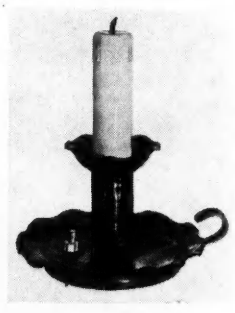
The louvred fitting is another modern trend and also a good example of directional light control. The "Harlouvre" production of Harcourts, Ltd., has a globe of striking modernistic louvred design. The underside faces of the globe are of clear glass and add substantially to the "downlighting" effect. The Hawkins "Wundalite" consists of a frosted glass cone which fits into an opal reflector, and the unit is set off by a specially designed canopy which conforms to the pleasing outlines of the glassware.

From the general diffusion aspect, the totally enclosed lighting fitting has a greater degree of control than is often attributed to it, especially the sphere with a well-designed reflector. The Troughton & Young "U10R" equipment is such a unit and has an 8-in. sphere of white flashed opal glass and a chromium gallery mounted in a matt cellulose dome. Each of the sphere fittings of Siemens Electric Lamps & Supplies, Ltd., has a three-ply glass globe carried on a three-way spider and secured in position by a self-centring cover plate. The "D.P. 599" unit of Hailwood & Ackroyd, Ltd., is a departure from the usual shapes of totally enclosed fittings. The globe is stepped rather like a three-shed high-voltage insulator.

Ceiling fittings, *i.e.*, those for fixing direct to a ceiling, are usually of the totally enclosed type and essentially of the utility class. The "4923A" one-light ceiling fitting of Dernier & Hamlyn, for instance, is a fine piece of work with its central bowl and large frosted and clear disc. Again, there is the Froy "A513" square box fitting with c.p. or cellulosed metal work, flashed opal glass side panels and sandblasted bottom with a clear edge. Drake & Gorham have a three-section box ceiling unit with two sections horizontally disposed on either side of a vertical section.

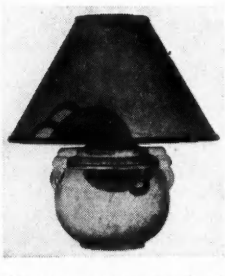
The type "DK" ceiling fittings of Zeiss Ikon, Ltd., utilise Zeiss mirrors for light control. Of squat cylindrical design the bowl is carried in a gallery of the same diameter and fixed direct to the ceiling. A small G.E.C. ceiling fitting for general purposes is suitable for fixing either flush to the ceiling or direct on to a surface conduit box. A recent introduction by Wm. McGeoch & Co., Ltd., is a circular ceiling fitting in cast brass with flashed opal glass panels and a recessed reflector. The fitting measures 26 in. in diameter and projects 4 in. from the ceiling. The ceiling fitting by Victor H. Iddon, Ltd., is specially designed for damp places where a shockproof reflector type fitting is required.

The "Moon" lamp of V. & E. Friedland, giving a low-voltage subdued light for bedrooms; the "Duco" desk lamp by Brown Bros., Ltd., which is adjustable without wing nuts; the "Jecolite" sewing machine lamp by Johnson Engineering Co., which clips instantly on the frame of the machine; the "Localamp" of the General Inductance Co., Ltd., in which the gimbal-mounted reflector can be tilted to any angle apart from the flexibility of the arm; and the electrical bathroom units of Valbania, Ltd., with tube lamps bracketed above the mirrors, are all utility equipments of special-purpose character.



Realistic candle fitting (Cooper & Smith)

From the utility point of view the kitchen lighting is easily the most important of any in the home. Because of this, and more particularly because the "workshop of the home" very often receives the least attention in lighting matters, we quote the following extracts from the E.L.M.A. publication "Home Lighting":— To obtain an even distribution of light, entirely free from glare and harsh shadows, fittings of the totally enclosed type should be used. These fittings are marketed as "kitchen units" and consist of a globe of white diffusing glassware, secured to the ceiling by means of a metal gallery which is usually enamelled white for hygienic purposes. If the ceiling is high a suspension can be employed. A 100-W pearl lamp is recommended for use in these units, though they are made for any size of lamp from 60 W.



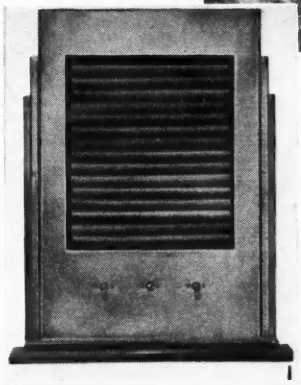
Siemens pottery standard

Fires and Convectors

A general simplification of the design of electric heating apparatus, coupled with increased output, has enabled manufacturers to lower their prices this season, or alternatively, to give still better value for money.

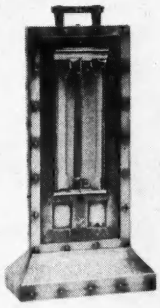
An almost general decrease in prices of apparatus will be the most predominant factor in the development of electric heating this winter. Prospective purchasers, who postponed their buying last season owing to the 10 per cent. advance in list prices which most manufacturers were forced to make, will no longer need to delay, for prices, with few exceptions, are now as low as they have ever been. Where prices have not been reduced, usually there is some compensation in the way of minor improvements in construction or in better or more attractive finishes.

The reason for this lower cost of apparatus, so Simplex and some of the other manufacturers tell us, is not so much a decline in production costs (holidays with pay have to a certain extent offset the recent fall in the cost of materials), but to the very considerable increase in output during recent months.



1

Restricted always by two constants—the distance of the heat source from the ground and the more or less recognised standard shape and size of the elements, manufacturers are finding it more and more difficult to produce new designs, and a few we have met recently are, in desperation, toying with the idea of varying the element design in order to produce at least some sort of originality.



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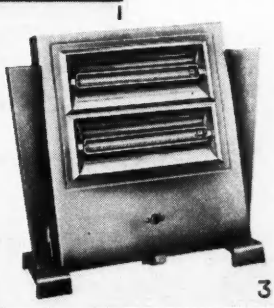
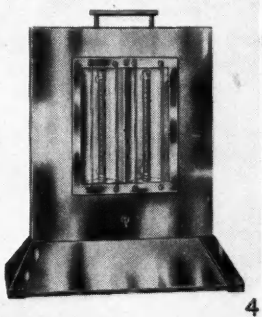


3

So far, however, all but one, we believe, have been able to restrain this urge to introduce this entirely unnecessary and unjustified complication into the question, and they have, as a general rule, contented themselves with reducing the number of new lines to the minimum compatible with keeping up to date and with concentrating rather more on improving colours and finishes.



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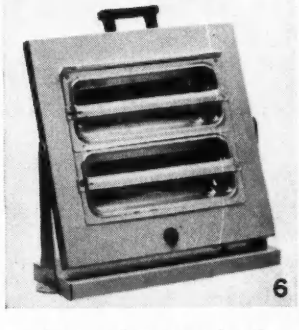
Some manufacturers, Premier and Jackson to mention but two, are producing no new models this season, and they will rely on the continuance of popularity of their last year's products, the increased output planned by Premier resulting in savings in production costs which will justify reductions in the prices of several of the most popular patterns. This decision will, no doubt, find a welcome reception by dealers, who naturally dislike having stocks of obsolete apparatus left on their hands.

After all, there is no reason to change a design just for the sake of change. If a design is good, both technically and æsthetically, the chances are that it will continue to be popular indefinitely, as, for instance, the Belling "Boudoir," the Premier "Countess," and the Carron "Canterbury," "Lincoln," and "Gloucester" have been for several years.

Last year's tendency towards simplification continues, and, as in lighting apparatus, there is a definite trend away from the severity of straight lines to the softer, more comfortable grace of curves and rounded corners. Not only does this preference for curves produce a more satisfying appearance to the artistic eye, but, of rather more practical importance, it provides a more hygienic design with the very minimum of crevices for the dust and dirt to lodge in.



6

No better example of this is to be found than in the neat new Ferranti "Hearth" fire, which is available in both 1- and 2-kW models. Of the utmost simplicity, this unit has its "Solium" or chromium reflector inset in a gently curving body, the only adornments being long oval strips of metal at top and bottom following the general contour. In this, as in the fires, such as the Revo "Don" and "Eden," the G.E.C. "D2499," the Grafton "No. 10," Electroway "Scroll," and various Elcap models, the simplification of design has been reflected in the low prices.

Although simplification is the keynote of practically all new designs, the addition of some slight decoration often gives a touch of distinction. The sort of thing we have in mind are the plain yet ornamental side projections of the Siemens "Sussex" (which, incidentally, is now available in cream) and the "Cornwall," which is last season's popular "Lancaster," with the added advantage that the centre portion can be tilted to give any required angle of heat projection.

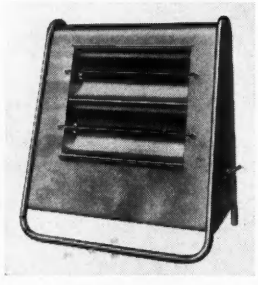
A small "bow" of chromium plate gives a neat touch to the new B.N.E. sheet-metal radiators, the low-priced "Kenilworth" (1 kW) and the "Warwick" (2 kW), and a somewhat similar effect is produced in the switch surround of the Revo "Avon," and in the slight ornamentation of the body and legs of the Eveson "Doric" and "Ace." The device of staggering the elements has been resorted to in the C.W.S. "Dudley-Electric Futuristic" and the Bulpitt 2-kW "Cromwell," the latter fire, incidentally, now being available in 1-kW form with the elements mounted vertically.

1. The Tricity "Lokost." 2 and 6. Bulpitt "Cromwell" (1 kW) and "Henley." 3. Siemens "Cornwall." 4. Revo "Humber." 5. Bratt Colbran "No. 171"

A somewhat more drastic expedient has been adopted by Hattersley in the design of certain of its "Swinton" models. Not only are the elements staggered, but the whole body is made asymmetrical. With a slight relief in the form of geometrical designs, the result is surprisingly effective. Still more revolu-

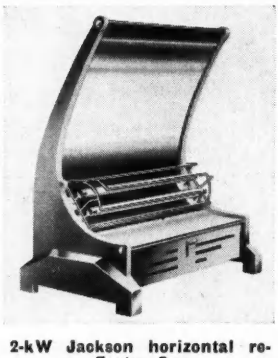
tionary is the use by Dowsing of fan-shaped fire-bar elements to give novelty to its "Rubens" and "Hogarth" fires. Originality has been achieved in quite a different way in the neat Moseley "Cradle" fire. Elexcel and Alneco are prepared to design and manufacture any type to suit customers' individual requirements.

Illumination effects have proved useful to manufacturers on the look-out for new ideas. English Electric has utilised them in no fewer than three out of four of its new models, while Ferrantis this season make their first use of colour lighting in the new "Lumera." In the two vertical columns of this model are two red lamps, which flood the whole of the back plate and the reflector, even when the elements are not on. The fire is available in a wooden surround, which has an orange light under the mantelshelf to flood the top half.



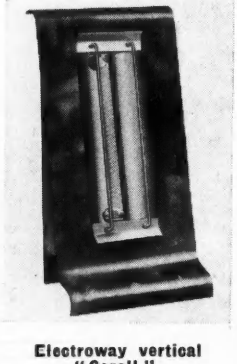
G.E.C. sheet metal fire with tubular frame

The Creda "Hearth Glow" models have proved so popular that another design has been added, the "Compton." With its three 1-kW elements arranged to give a wide angle of distribution, this fire has a flat back-plate large enough to cover practically any existing fireplace. That the effectiveness of the illumination is dependent largely on simplicity of treatment is apparent from the Carron "Carrolite" and the Falk, Stadelmann "Sunface" models. The latter company's novel circular "Sundial" model, with its soft glowing amber light framing the reflector, will no doubt have a widespread appeal, and for those who favour the modernistic trend there is the C.W.S. "Dudley-Electric Panel-bar" fire, with a large floodlighted decorative centre panel interposed between two vertical reflector units.



2-kW Jackson horizontal reflector fire

Tricity Cookers were one of the first manufacturers to appreciate the psychological value of lighting in fires. In their new "Lokost" model the 1½-kW loading is made up of two 100-W heat lamps and a 1,300-W ladder-type element with reflectors behind. All this heating equipment is concealed behind anodised aluminium louvres which are illuminated by the lamps. A bullseye glass glows green when the lamps only are on and red when the heaters are in circuit. The illuminated louvre effect is, of course, still employed in the "Tricity Sunray" models also, which are marketed by L. G. Hawkins.

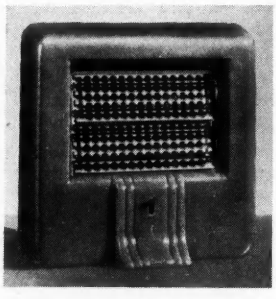


Electroway vertical "Scroll"

To a certain extent lighting effects are supplanting imitation coal and flicker devices, and the Berry's Electric *pièce de résistance* this season is the low-priced portable version of the "Chameleon," introduced earlier this year. The "Winsomberry," as it is called, incorporates in its base an inverted spherical bowl through which comes a constantly changing coloured light. This light illuminates the back plate of the fire, and in the summer a pleasing effect can be achieved by placing flowers in the holder provided. Either "warming" or "cooling" colours can be had at will. The 1-kW vertical reflector elements are adjustable to direct the heat in any desired direction. Berry's Electric are also marketing, at a surprisingly low price, a simple form of illuminated radiator called the "Eveberry."

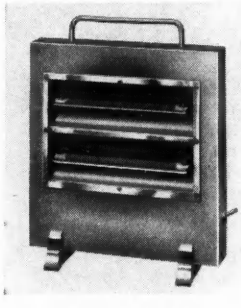
The "Countess" (Premier Electric Heaters)

The more general adoption of lighting effects does not mean, however, that imitation coal fires are not still popular, and this class of business should receive a further fillip as a result of the recent introduction by Bratt Colbran of the "Sunrise," in which the actual imitation fuel becomes glowing hot from heat reflected upwards from four spiral-wound elements. There are no lamps to replace, and dust particles and cigarette ends, etc., inadvertently thrown in are consumed just as in a real coal fire. Further details and an illustration appeared in our last week's issue.



Belling "Clarendon"

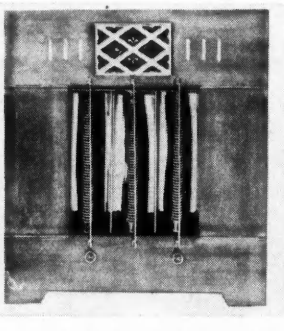
Of the more conventional types of imitation coal fire, perhaps the most unusual is the Creda "Harrow," which has an adjustable reflector element, and a tubular frame combined with an imitation coal unit. The fire is portable and, finished in silver cloud, should harmonise with modern schemes of decoration. For small rooms where people sitting close might find a reflector fire uncomfortable, Simplex offer the "Henley."



B.N.E. "Rhuddlan"

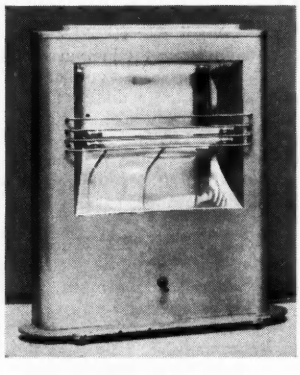
In an entirely new type of coal-effect fire (the "Old English" dog and basket grate), produced by Berkeley & Young, all the elements are hidden inside the body of the fire, and to all intents and purposes the heat emanates from the coal itself. All the cheery glow, cosiness and psychological appeal of the coal fire is thereby retained, without the illusion being destroyed by the usual elements. Heating is by forced convection, a motor-driven fan circulating air over low-temperature resistors, causing a steady flow of hot air to circulate throughout the apartment.

A hot ash-tray effect is produced in the 2-kW "Joyberry" (Berry's Electric), which, by means of the "Mirage" device introduced last season gives the impression of having twice as much coal as it actually has, the flames appearing to come from the coal itself. The same effect is used in what is claimed to be the first portable log fire, the "Woodberry"; this model is designed to stand in front of an existing fireplace.



James Smellie, Ltd., "No. 4,537"

Specially constructed to harmonise with the modern trend in architecture are the Revo "Thames" and the Carron "Hood," both models showing evidence of the preference for curves in design. Carron, however, also have a new "straight-line" model in the "Rodney." The three new "Electrocoal" models brought out by Electroway Heaters have a very realistic flicker effect, and B.N.E. have improved the appearance of their "Talisman" fire by mounting the elements horizontally instead of vertically.



2-kW Ferranti "Hearth"

Not satisfied with a coal effect only, Belling have incorporated an ornamental illuminated grille around the "Multi-Parabola" fire-bars of their

Typical Up-to-date Electrical Heating Apparatus

1. Creda "Brendon" combined radiator and convector. 2. Ferranti "Lumera." 3. Siemens "Somerset." 4. English Electric "Super" reflector fire. 5. Graham Farish "Minnie." 6. Carron "Hood." 7. Manor "Specular." 8. Limit "Radial Radiant" reflector model. 9. Morphy Richards "Senior." 10. Carron "Carrolite." 11. Belling "Lounge." 12. Falk, Stadelmann "Sundial." 13. A Bell panel fire. 14. Creda "Harrow." 15. Bratt Colbran "Flamingo." 16 B.N.E. "Glamis." 17. Berry "Woodberry." 18. Arora "389"

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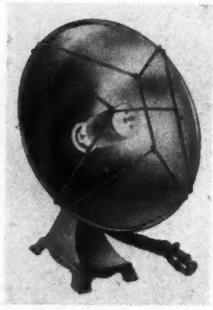
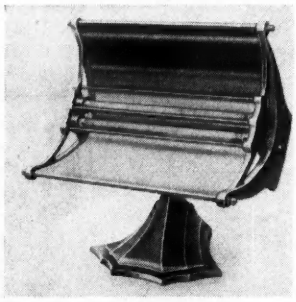


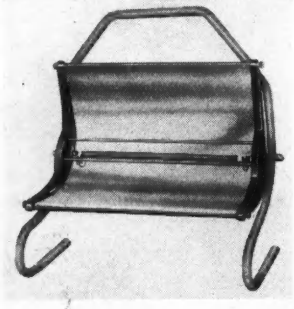
"Duco" bowl fire (Brown Bros.)

new "Starlite" model, which, with a framework finished in bronze with bright, rustless relief, is large enough to hide completely the existing fireplace openings. The new "Formalite" coal effect used is particularly good, and it provides equally pleasing results in the "Hearth" fire. Fitting into any standard fireplace, this model fulfils the same function as the popular Berry "Adjustacoal" and "Adjustalog" and the Bratt Colbran "Lectracoal." Also now fitted with the new "Formalite" coal, the "Cheery" fire has been reduced in price, and is one of the cheapest imitation coal fires obtainable.



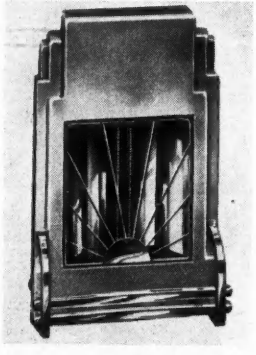
R.E.A.L. "Wonderbar"

So overwhelming is the number of reflector fires on the market now that it is becoming almost impossible to strike any new notes in design, and it is largely in the matter of relatively trivial details of appearance that manufacturers are able to score over their rivals. The graceful bird-like design of the Bratt Colbran "Flamingo," the elegant simplicity of the Siddons "Essco No. 1130," the more severe curved lines of the Brown Bros. "Duco Minor," the decorative cast-iron sides of the Grafton fire, the touch of ornamentation on the Hattersley "Swinton No. 70," and the attractive modern pedestals of the R.E.A.L. "Wonderbar" and the Forward reflector fires are sufficient to "lift them out of the rut," while the incorporation of a lamp to illuminate the reflectors even when the elements are switched off is a strong selling point for the Manor "Specular" fire.



Dowsing "Turner"

Robustness and simplicity prove an attractive combination in the new G.E.C. reflector fires available in two distinct sizes of 750 or 1,000 W and 1,500 and 2,000 W respectively, while the finish (chromium with silver cloud ends) of the low-priced "Creda Avon," which is available in ¾, 1, 1½ and 2-kW sizes, and can be adapted for wall mounting, is very pleasing. A new lightweight portable, the "Dee," should be a popular Revo line, and Belling have just introduced a "Junior" model of their "Solray." The Jackson vertical reflector fire is "still going strong," and the 2-kW horizontal fire, introduced last season with a special reflector ensuring correct focusing no matter whether both or only one element is in use, has met with a good reception. The compact Graham Farish "Minnie" and the graceful Hawkins "Empire" are expected to continue good sellers, and Premier offer an attractive choice of models.



Hotpoint "Reliance"

A large proportion of the reflector fires are equipped with swivelling devices, thus enabling full advantage to be taken of their focusing qualities, and we like particularly the Siemens "Suffolk" and the pedestal "Surrey" models; the Bulpitt "Swansea" and the simple vertical "Henley" fires, and the Hattersley "Swinton No. 75."

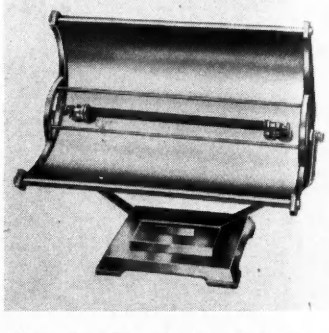
Since the parabolic design has now become almost universally adopted as the most suitable for reflectors, it is interesting to find Hotpoint breaking away from convention and introducing a hyperbolic reflector in their new "Advance" fire. The focusing qualities of the reflector are thus largely abandoned, but in their place come the advantages of a much wider distribution of heat and the elimination of all risks of scorching or overheating in any particular spot. Probably this accounts to a large degree for the continued popularity of many of the older type of fires with their wide-angle reflectors. Much the same idea is behind the trapezoidal reflector, which has been employed with such success in the same company's "Mountview" radiator brought out last season, and now making its appearance in a new guise in the "Reliance." Actually this attractive new fire is a combination of last season's "Mountview" and the "Ambassador" models.

The disadvantage of the somewhat restricted lateral radiation of the reflector fire has been substantially overcome in the Limit "Radial Radiant" reflector fire, which, by using a curved reflector and curved elements, is claimed to give an even distribution of heat over a radius of 120 deg. from the centre of the heating element in the horizontal plane.

Before leaving the subject of distribution of heat from reflector elements, it is interesting to notice the increasing number of fires now being made with three elements mounted at different angles. English Electric have a new one in their "Super" reflector fire which has a cosy hearth effect, while Berkeley and Young offer two such models, the "Royal" imitation coal fire, and the "Palace" with an illuminated grille at the base. The same idea has been adopted for the new Bratt Colbran "No. 171." This arrangement is, of course, unnecessary with elements of the firebar type, which in spite of the growing popularity of reflector elements, still hold their own in situations where long-period or dispersive, non-focusing heat is desired.

Berkeley & Young "D.338" convector

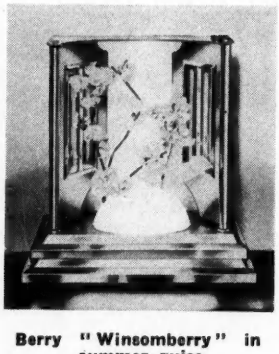
Despite the increasing sales of the lighter and more easily portable units, which perhaps lend themselves rather more readily to present-day fashions in decoration, there appears to be no diminution in the demand for the cast-iron fires. Their ability to withstand rough usage must be one of the principal reasons for this, and the latest versions, such as the new G.E.C. "D 2382" and the Falk, Stadelmann "Sunshine," lack nothing in the way of elegance of appearance.



Hattersley "Swinton" reflector fire

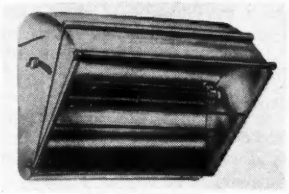
The tendency towards substituting curves for straight lines is particularly noticeable in cast fires, good examples being found in a new B.N.E. model, the Revo "Severn," and in the 2-kW Creda "Chiltern," the "stepped" effect of the latter being particularly attractive. We like, too, the graceful appearance of the new Belling range of cast majolica fires, the "Clarendon," the "Embassy" and the "Empire." The last model, which is made in three sizes and two neutral finishes, takes the place of the popular "Beacon," but is lower in price.

Another milestone in the history of the electric fire is passed with the discontinuance of the once popular gas-fire-like units that have been a feature of the Jackson catalogue for so long. It was, of course, inevitable that the first models should be designed on the same lines as gas fires, but in course of time manufacturers have developed a new technique more suitable to electricity, and they no longer have need to pick their rivals' brains for inspiration. Rather is the boot on the other foot, as a glance round the gas showrooms will testify.



Berry "Winsomberry" in summer guise

Manufacturers are paying increasing attention to the



The Revo "Bath"

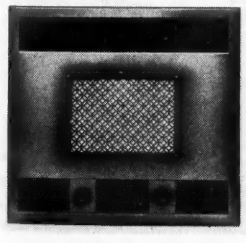
question of finish, and, while limiting the number of standard colourings available, aim at producing shades which will readily harmonise with practically any surroundings. An attractive neutral tint is employed to good effect on the new English Electric models, and Falk, Stadelmann can now supply practically all their fires in a striking brocade finish. Both Dowsing and B.N.E. have some new pastel shades to offer, while the new "Creda" ivory and gold finish looks particularly well on the "Chiltern" model. The Berry "Wendy" is this season available in colour, and on the Ferranti "Lumera" and "Flamera" models a new finish, "Ambronze," having a gold-like appearance is to be seen.

The use of tubular steel in radiator construction is perhaps not quite so prevalent as a season or two ago, though we are told that such models as the Revo "Tubula," the Dowsing "Turner" and "Hoppner," and the Graham Farish and Morphy Richards models, are as popular as ever. We notice one new application, however, in a G.E.C. sheet-metal fire which incorporates a chromium-plated tube as the framework. The G.E.C. is also continuing its pioneering work with the bakelite model introduced last season and besides adding a cream model has reduced the price. The Mitchell Electric Co. is still the sole producer of the bakelite electric "coal" fire, the "Supremus."

Bowl fires are to a certain extent being superseded by the low-priced reflector fire of the adjustable type, though a few new models have made their appearance. The G.E.C. "Pedestal" model is substantial without being clumsy, while a slightly decorated circular surround is a worthwhile addition to the Electrical Commodites "Samson" model. The special feature of a new A.E.G. fire is the care taken to render it absolutely safe. Brown Bros. "Duco Minor" is still a good seller. The Vidor radiators serve much the same purpose as bowl fires for local heating.

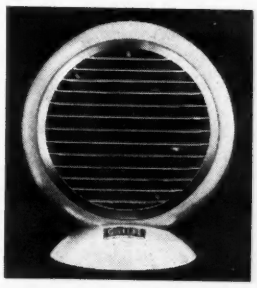
The bowl fire appears in a new guise in the Moseley "Eddo Cone" fire. Mounted horizontally, a normal bowl reflector directs the heat upwards to be deflected downwards again by means of a second conical reflector. The warmth is thus radiated all round. The same idea is behind the design of the new Hotpoint "Tewin," which, reminiscent of a bird-cage, has a 1,250-W rod-type element mounted vertically between two conical reflectors. As a safety precaution a mercury switch is mounted in the heavy metal base in case the fire be accidentally knocked over.

For bathroom use most manufacturers produce versions of their adjustable reflector models for mounting high up on the wall by means of screws, cord attachments being usually provided (as in the Bulpitt "No 729" and the Mitchell "Crescent No. 124 W" models) to permit tilting without touching the fires themselves. An ingenious wall shoe enables the Morphy-Richards "Junior" to be lifted off for use as a portable model if desired. Elaborate safety precautions are the keynote of the new Revo "Bath" reflector model, and provision is made for distant switch control in the outset "Arora" fire-bar model designed for mounting at the normal distance from the floor. The R.E.A.L. bowl fire with a flexible mounting provides a useful alternative arrangement.



Artic inset convector

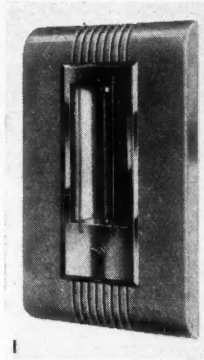
The use of fixed fires is not being encouraged as much as it should be. The installation of an inset or wall fire does not spoil the chances of selling equipment for other rooms as a portable unit does and, furthermore, it is safer. From the builder's point of view, too, it has many recommendations, foremost among which are economy of space and the elimination of the necessity of the chimney breast, the saving in cost of the brickwork usually being more than enough to cover the price of the electric fire and surround. Practically every manufacturer now caters for this class of business. Simplex are running two distinct ranges of "Creda" insets—an inexpensive though well-finished type, including a neat new model, the "H.879," and a special high-quality range. A new chromium-plate inset with two 1-kW rod-type elements placed one in front of the other is announced by the G.E.C., while Hotpoint, whose range includes a circular model has brought out a 2-kW version of its "Byron" unit. Possibly the most attractive of the Siemens insets, the 2-kW "H.432," is to be found elsewhere incorporated in the company's outset "Westmorland" and "Somerset" models. Efforts at originality include the illumination effect of the Artic "Sun-Glade" inset floodlit fire, the sunrise effect guard in the Hattersley models, and the decorative framework of the Siddons "Essco No. 1125," and the Grafton insets. Special provision is made in a Hedin 3-kW bar-type model for ensuring proper room ventilation.



A. C. Gilbert fan heater

Easy fixing is a feature of the new B.N.E. "Glamis" cadmium-plated inset, which is simply pushed into the recess, a spring holding it in position. The same company's "County" is now available as a 2-kW model. A patent one-screw fixing arrangement can be used on almost all the "Mitchell-Crescent" insets. Generally outset models are preferable for existing buildings as they do not require any recess. An inexpensive range of cushion-like vitreous-enamelled cast-iron fires introduced by the G.E.C. have sheet-metal backs, which are screwed to the wall, the bodies being secured by two screws. Two attractive cast-iron models, the "Tyne" and "Clyde," are newcomers to the Revo range, and Walsall Conduits offers the "Surfis" and the "Vulcan."

Many more manufacturers are killing two birds with one stone by supplying complete surrounds for their inset fires. Not only does this mean more business but it ensures that the fires will be set off to their best advantage. Bratt Colbran and a few other makers have, of course, for many years specialised in such business, but it is something new for such manufacturers as Simplex, who are now listing a complete range of easily fixed pressed steel surrounds each capable of taking three or four different "Creda" insets, which are available in various attractive finishes. All the Hotpoint insets, too, can be had in appropriate surrounds, while



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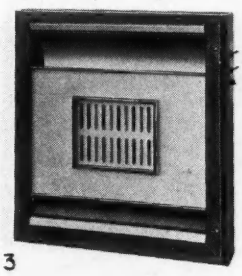

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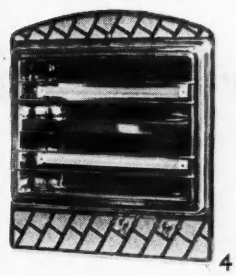

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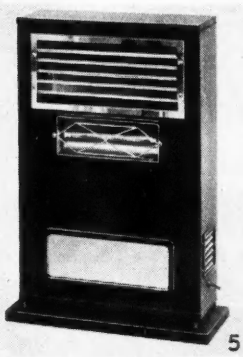

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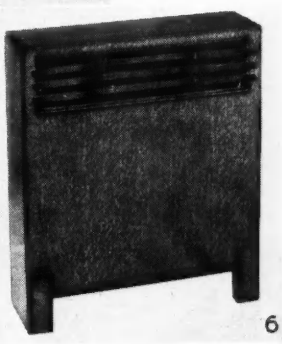


6

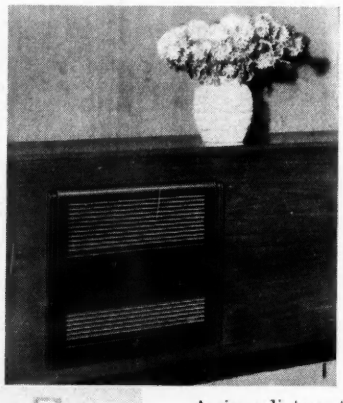
1. G.E.C. surround with "D.2721" fire. 2. Berkeley & Young "Old English" basket grate. 3. Falk, Stadelmann "De Luxe" convector. 4. Siddons "No. 1.125" inset. 5. English Electric convector. 6. A "P.H." convector (Greene Phillips)

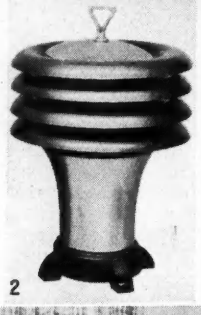
"Eddo Cone" fire (Moseley)

the G.E.C. can now supply its standard "D.2721" 1-kW chromium-plated inset fire in a cast-iron surround for flush mounting on the wall, a selection of opaque or majolica enamel finishes being available.

A very attractive floodlight effect is incorporated in the Hattersley "Swinton No. 81" model, and particular care has been taken by the Bell Fireplace Co. in designing suitable settings for its panel fires, which incidentally have special reflectors, "Evercool" element contacts and decorative safety grilles.

The open coal fire dies hard but there appears to be a growing demand for the fireplace which can be adapted at short notice to accommodate an electric fire. The "Ivanhoe" unit (James Smellie) with its interchangeable electric fire is an example of a complete fireplace designed for the purpose, while for use in existing fireplaces there is an ever-increasing number of screen fires. Among these the first to come to mind are the Belling "Converta," the Siddons "Esco No. 1128," and the B.N.E. "Adapto," which, counterweighted, require no fixing and will fit right into almost any sized openings. The "Adapto," by the way, is now obtainable in beige and silver-grey finishes. Similar to the three fires mentioned, the new English Electric screen fire has adjustable legs, making it suitable for openings from 20 to 24 in. high.





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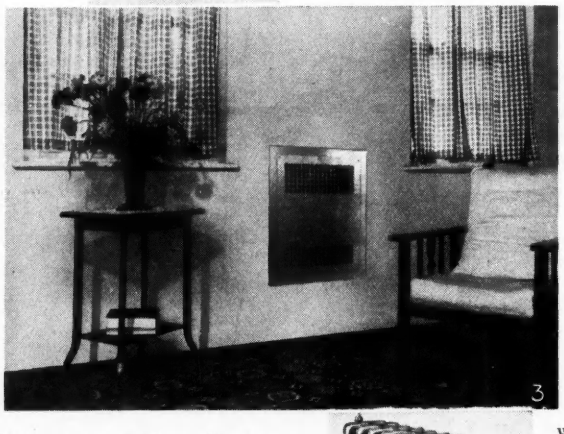

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1. Panel type "Thermovent" (E. K. Cole). 2. C.W.S. "Dudley-Electric Conveeta." 3. Unity "Floodwarmth" inset convector. 4. An Ideal radiator

A very pleasing lighting effect has been incorporated in the new Belling "Lounge" screen fire The two 1-kW firebars are mounted in an oxidised brass framework, which is surrounded by an ornamental grille, the back of which is illuminated by an amber lamp. In the same company's "Visor" model the firebars are actually set back behind the illuminated ornamental grille. The utmost simplicity has been adopted in the design of the Walsall Conduits "Monarch" and "Coniston," and a modernistic touch has been achieved in the Revo "Humber" by means of a pyramid base. Both utility and appearance benefit from the use of a tubular steel frame-cum-handle of the Hattersley "Swinton No. 80." The scroll effect of the Dowsing "Rembrandt" will appeal to many.

Heavy plywood, finished in black or oak, forms the screen of the handsome Siemens "Westmorland" unit, and improved reflectors and new finishes are features of the already popular B.N.E. "Raystone," which now has a new "baby brother" in the "Rhuddlan." Both Falk, Stadelmann and Belling have brought out new cast-iron corner models.

The ability to boil a kettle or perform simple cooking operations on an electric fire is still appreciated. Equipment constructed largely with this object in view includes the Moseley "Eddo Super Trivet," the anvil-like "Carronaid," the Arora "105" cooker fire, and the fourteen-year-old Creda "Handy."

Fan heaters either in normal form or disguised as radio sets, car headlamps, mushrooms, &c., are obtainable from such manufacturers as the G.E.C., Philco, Belling, A. C. Gilbert, the A.E.G. Electric, Toubkin, H.M.V., W. T. Driver, Collaro and L. G. Hawkins.

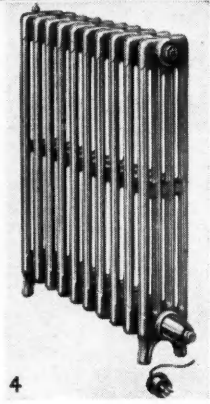
For hotel use B.N.E. now produce their popular 2-kW "Raystone" with a meter mounted in front, and Berry's Electric have a modification of their 3-kW "Dormy" model. In the attractive Carron "Carrometer" the meter is concealed inside.

Slowly but surely convectors are capturing the public's favour, with the result that more or less in self-defence several manufacturers who see little future for this form of heater at the existing electricity tariffs are now listing models. These, for the most part, are little more than attractive boxes with the usual high-temperature radiator elements concealed inside and are scarcely our conception of the correct media for producing convected heat, which appears on the face of it to demand low-temperature treatment from specially constructed elements.

As in radiators, the use of illumination has been called into service in a large number of cases. Illuminated grilles have been incorporated in the new Belling models. Both warmth or coolness can be suggested by the amber and blue lamps provided in the new "De Luxe" convector marketed by Falk, Stadelmann, who are also introducing a range of all-metal units. Lighting effects also play a big part in the appeal of the Graham Farish, Bulpitt "Swanvector" and "Dudley-Electric" models.

While not changing the design of their "Apex" and "Summit" convectors, Simplex introduce two 2-kW models. Bratt Colbran report continued progress with their "Evenheat." Somewhat unusual designs have been adopted for the Hedin units and an imitation coal effect is used in the B. & Y. "Vectacoal." An Artic inset convector is claimed to be the only one providing high velocity warm air circulation without fans. To the range of "Thermovents" E. K. Cole have added a panel unit constructed of plastic material available in colours. The boxes of the Unity "Floodwarmth" cabinet convectors are made of heat-insulating material enabling them to be inserted directly into the wall.

A 2-kW radiator combined with a ¾-kW convector, forms the Creda "Brendon," much the same arrangement being used for the Belling "Twilite," which also incorporates an imitation coal effect. In the English Electric Co.'s newly introduced convector a 1-kW radiator has been inserted in the casing, the convected heat coming from a brightly lighted grille. The Bertram Thomas "Bi-Heat Duplex" gives radiant heat from the casing and convected heat from the top.



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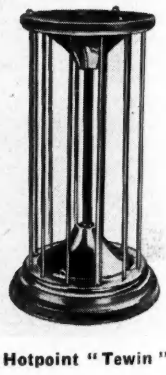
For those people who like to obtain their convected heat from apparatus similar to that used in a hot-water central heating system Benhams produce the "Electro-vapour" and the waterless "Electrovex" heaters. Another form of convector, the Soapstone heater, utilities the heat storage properties of that mineral.

Among tubular heaters J.P. Tubular Heaters have a flexible model, while an oval type is made by Unity, who also produce four .3-ft. lengths mounted as a portable unit. Falk, Stadelmann sell multi-unit heaters arranged vertically. Other suppliers are Carron, Revo, Mitchell, Eastwoods and Bertram Thomas. Of similar application are the panel heaters made by Revo, Unity, Benham, &c.

Whatever form of convection heating may be adopted, it is strongly advocated that thermostatic control should be employed.



Hotpoint "Tewin"

Cooking Equipment

The more general adoption of thermostatic control should have a considerable effect on the popularisation of electric cooking, while developments in hot-plate design and control remove the last criticism that can be made against electricity.

SOMEWHERE about 8½ million householders in this country already receive supplies of electricity and about another 5 million have yet to be connected. Every one of these is a potential cooking consumer, but how many actually are? In spite of the excellent progress made recently not even a million. Who or what can we blame for this?

There can be no shadow of a doubt that the present-day electric cooker has the gas model beaten "hands down" on the score of efficiency, reliability, simplicity, health and cleanliness, and except in a few districts it is just as cheap to use—often cheaper. As will be seen from the review of equipment below, manufacturers are ensuring that this supremacy is maintained by being constantly on the alert as to methods of still further improving their apparatus. It does not appear, therefore, that we can hold the manufacturers or their products responsible for the slow progress.

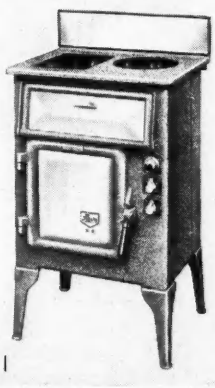
Conservatism and prejudice against anything new must, of course, hinder development considerably in pioneering days, but pioneering of electric cooking is, or should be, now a thing of the past. Can it be then that supply authorities are taking matters too complacently and are satisfied with putting out, say, four thousand new cookers a week when they might with little more effort add double or treble that number?

There are, we believe, some authorities who are afraid to encourage the use of cookers too much for fear of the effect that the extra load may have on the maximum demand charges payable to the Central Electricity Board. Surely this must be a short-sighted policy, for it has been proved without question that the more electricity is employed for any purpose the more likely it is that its use will be extended to other applications. And the wider the diversity of uses the better the chances of improving the load factor.

In some districts, too, development is hampered by the inadequacy of the mains, which renders them quite unsuitable for the increased demands placed on them by the cooker load, but this state of affairs is, we are glad to say, rapidly being rectified.

Local gas interests and their vigorous publicity are still having a deterrent effect on electrical progress, and in this connection it might be as well to remember some remarks by Sir David Milne-Watson in 1934. Presiding at a meeting of the Gas Council of Great Britain and Ireland he said: "All appliances falling short of the standards required in a quickly changing world—the ugly cooker, the low range necessitating stooping, the obsolete stove—must go. Ruthless scrapping may appear at the time to be expensive, but will undoubtedly repay handsomely those who undertake it boldly." These opinions might equally well have been addressed to the electrical industry and they might now be applied not only to the antiquated coal, oil and gas stoves but also to the many old-fashioned electric models that are out on hire.

Sir David also said: "Our propaganda and salesmanship should be directed to focusing the attention of consumers upon those characteristics of the best gas appliances which have no counterpart among those supplied by our competitors. In years to come the public will demand scientific thermostatic control in every cooker and the sooner they do so the better it will be for gas undertakings, as we have here a device which cannot be copied so far by our competitors."



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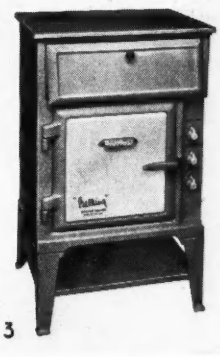

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1. The Revo "R.S." 2. Falk, Stadelmann "Flatlet Senior." 3. Belling "43A." 4. English Electric "H.C.212"

That these remarks have been heeded is obvious, and we think that the electrical industry is perhaps worthy of some censure for being a trifle backward in countering that propaganda effectively. In the thermostatically controlled electric cooker we have a complete and irrefutable answer, but till last year there were only about three electrical manufacturers who saw any future for it. Now every single one supplies such models. True, many of them still consider the thermostat more or less in the light of an unnecessary luxury, except, perhaps, in the case of long-period cooking, and tell us that three-heat switching will give us all the control and variation of heat the housewife is likely to want.

But will it? After all, that is a question for the housewife to decide and we have yet to hear of one changing back to three-heat switching after once having thermostatic control. As a matter of interest we should like to know how many managers of supply undertakings have taken the trouble to try out a thermostatically controlled oven in their own homes. The thought of hundreds or perhaps thousands of obsolete cookers out on hire probably deters them, but sooner or later they will have to face up to the question.

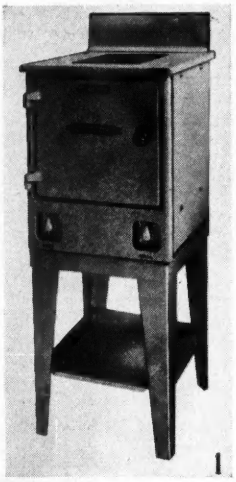
Gas competition apart, we feel, in common with several go-ahead undertakings, particularly in the North, that the thermostat has got to come eventually. It has always been an essential feature of water heating and low-temperature heating installations and it does not seem unreasonable to assume that it will ultimately play an equally important part in cooking.

With the adoption of thermostatic control there are, however, certain dangers to be avoided. It must never, for instance, be permitted to provide an opportunity for manufacturers to be careless about their lagging arrangements or for obscuring some other fault in design, and usually some modification in general design of a cooker is necessary if the utmost benefit is to be obtained. The English Electric, for example, have gone to the trouble of designing special

elements and air-circulating system and they have been rewarded by achieving a temperature control to within ± 5 deg C.

Whether alterations in the oven design itself are made or not, almost all makers are seeing to it that thermostatic control can be substituted for the normal three-heat switching with the minimum trouble, some manufacturers claiming to be able to make a conversion in as little as ten minutes. Also in readiness for thermostatic control, Elexcel normally fit their latest cooker, the "Xcel EH 381" (see full description in July 29th issue, p. 156), with a three-heat switch having a self-indicating knob, so that the only wording which need appear on the switch panel is "Oven," another self-indicating knob being substituted when thermostatic control is adopted.

Still manufacturers and supply engineers cannot make up their minds whether a thermometer is desirable when thermostatic control is used. Both the G.E.C. and Revo say definitely "No!" but there appears to be a strong demand from some quarters for an indication of the actual temperature, especially during warming-up periods. This immediately brings up the question of calibration, for it is almost inevitable, even if the liberty is taken of juggling slightly with the thermometer scale, that the different positions of the two instruments in the oven will result in some discrepancy in the readings. The probability then is that the housewife will condemn thermostatic control—and perhaps electric cooking as a whole—as being inefficient or incomprehensible.



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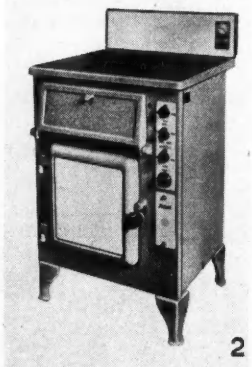

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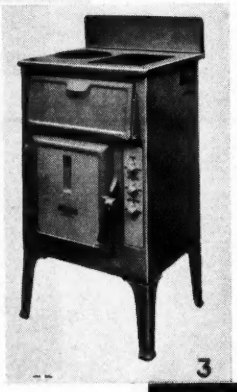
1. The Siemens "Minor." 2. Hotpoint "6052FT" with automatic time control. 3. G.E.C. "D.C.438." 4. Jackson "201J"

Three courses then lie open. One is to mark the thermometer simply "Low," "Moderate," "Hot" and "Very Hot" as, for example, Jackson and English Electric do. The second is to follow the example of the gas "Regulo" and adopt some arbitrary figures, say 1 to 12, for the thermostat, while the third alternative is the compromise which we have been led to believe the British Electrical Development Association is to recommend shortly, namely, the emphasis of the "hundred" figures of the thermostat. Apart from whether a thermometer is incorporated in the apparatus, the last-mentioned course has much to recommend it. The temperature settings are still there for those who want them, while, in addition, there is the added simplicity of the single numbers which will no doubt appeal to many.



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With regard to the conversion of old cookers already out on service to thermostatic control, supply engineers will welcome the new "Diamond H" and Arrow "Wilcolator" instruments. Without any additional panel drilling whatever, these one-hole fixing thermostats will fit in exactly the same position as the standard three-heat switches of the same make, the only other thing necessary being the drilling of a hole between the switch chamber and the oven to take the bulb. AC cooker switches with handles to match the new thermostats are already available.

If electric cooking becomes any simpler housewives will soon have nothing at all to do. They can now put the food in the oven early in the morning, go out all day, and come home in the evening to find the meal all ready to dish up. It is Hotpoint, who, carrying the application of thermostatic oven control a stage further, have made this latest facility possible by introducing automatic time control. The clock and the thermostat may be set any time prior to the "start" time and the current is automatically switched off when the cooking is completed.

This method of cooking, of course, involves the "cooking from cold" principle, which recently has secured a number of supporters. The one criticism we have heard from those who have tried it is that meat cooked in this way is too tender! Certainly if all that is said about it is true, the apparently wasteful heating-up period, to which we have so long been accustomed, will soon be a thing of the past.

Side and bottom heat has been adopted almost universally for the larger cookers, though the resulting inability to use the bottom shelf is favouring the provision of side elements only in the medium-sized models. Top heat (usually with bottom heat as well) is, of course, still employed in the smallest types of cooker where a grill-boiler is incorporated in the top and it is still to be found on all Moffat cookers, where it is claimed to provide better browning.

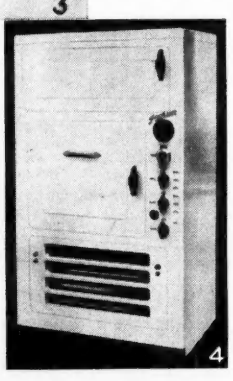
The attainment of better heat circulation and the elimination of "hot spots" have been occupying the attention of several manufacturers. Belling, for example, aiming at a large percentage of convected heat, arrange for air to pass up through the side elements before entering the oven *via* inlets at the top. This arrangement is said to do away entirely with the cracking of the enamelling, while the use by Siemens of plug-in elements with three separate spirals is another means of eliminating "hot spots."

Rubery Owen have gone about this business of achieving better circulation and more even heating by adopting the somewhat revolutionary expedient of making their "White Knight" oven circular in shape. This device, coupled with the use of pressed steel, is also said to save over 40 per cent. of the time taken to reach top heat by the usual type of electric oven, less than 11 minutes being required to raise the temperature of an empty oven to 400 deg. F. from cold, utilising only 1,250 W.

Claiming to heat the 14 in. by 15 in. by 12 in. oven of its "777" cooker to a similar temperature in ten minutes, employing 1,600 W, Tricity use side elements only, in conjunction with special heat reflectors, the pressed steel construction of the cooker being said to permit a 20 per cent. reduction in loading as compared with a cast model which has much more metal to absorb heat. Their contention that the heating of the oven itself is both unnecessary and wasteful has certainly a lot to be said for it.

Not only is pressed steel being adopted for technical considerations, but its ability to provide a better surface for enamelling and also the readiness with which it can be adapted to modern requirements of appearance recommend it strongly to manufacturers. Its lightness, too, is greatly in its favour from the transportation point of view. Many of the cookers in which it is employed at present—the Belling streamlined model, for example, with its refrigerator-like appearance, interior glass door, and foot-operated door controls—are of the *de luxe* class, but with increasing demand it should be possible eventually to sell them at prices considerably lower than those for cast models.

Mention of streamlining reminds us of the new Jackson "201 J" model, which combines an absence of unsightly projections with a white enamel finish to produce a very smart appearance, and, besides incorporating a main switch control, has a plug for kettle or iron. A novel feature of this cooker (which is also to be seen in the B.N.E. "Modernette" brought out last year) is the incorporation of a reflector-type fire in the base for warming the kitchen when the oven is not in use. If desired a hot cupboard, which is warmed from the bottom element, can be substituted for this fire.



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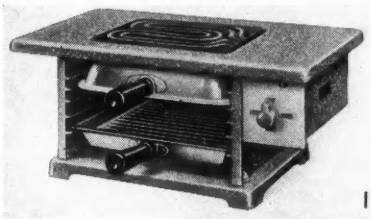
Hot cupboards or warming drawers, are, in fact, becoming a popular addition to several makes of cooker. They are now a feature of all the "Baby Belling" models and Rubery Owen not only have a draw-out grill chamber at the top but also, beneath the oven, a "utility" drawer which can be used either for storing pots and pans or for such purposes as leaving dough to rise. Warming drawers either at the side or below the oven are incorporated in all the L. G. Hawkins "Universal" models, some of which also include special steaming compartments.

The placing of simple shelves beneath some of the Jackson, Siemens and other makes of cookers is welcomed in small houses and flats where space is a consideration, and though

drop-down doors, as fitted by Moffats, Rubery Owen and L. G. Hawkins, do not apparently appeal to this country as much as they do abroad, they do provide a solid table support for the oven trays when serving.

The elimination of a certain amount of stooping is one of the means adopted by Tricity to secure the housewife's favour. All the switches of the "777" and "888" models are mounted (on an easily withdrawable chassis) above the ovens. The same idea is to be seen in the Hawkins "Universal" models, though in this case the switches are mounted horizontally at the side of the oven above the warming cupboards. Two switches each side of the grill chamber are Rubery Owen's solution of the problem.

Built-in main switches are becoming so common these days that it is almost certain that the I.E.E., which at present officially frowns on them, will alter its regulations on this point. A unit recently devised for "Creda" cookers is located inside the normal switch box, with the insulated operating handle projecting through the front casting. A clear indication is given of whether the switch is "off" or "on," in the latter case the word "on" being visible through the switch handle opening. The switch is enclosed in a separate earthed metal case within the switch box and provision is made for the switch to trip automatically in the event of anyone trying to reach potentially live parts, full interlocking with the cooker side panel and the hob equipment also being arranged for. Much the same general arrangement is used on the G.E.C. models.



1

In addition to the main switch incorporated in the new Elexcel "Xcel E.H.381" cooker a spare position has been provided for a rotary switch to control the kitchen water heater. The same cooker, which incidentally has been constructed to meet the special requirements of a customer, embodies a new type of ventilator and condensing arrangement, which is claimed to provide improved heat circulation and temperature distribution and to obviate steaming difficulties.

2

Some of the latest "baby" and breakfast cookers:—1. The Carron "B.3." 2. Belling "40." 3. English Electric "H.C. 253." 4. Hattersley "Swinton 0/27"

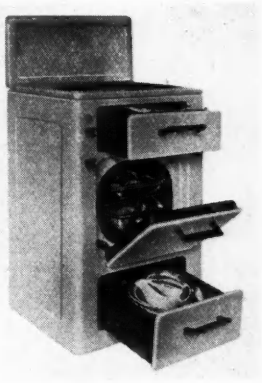
Following the introduction of thermostatic control to provide an infinite number of constant temperatures, it was inevitable that manufacturers should consider an extension of the idea to hotplates. Once again, of course, there arises the question: Is it necessary? Since the hotplate is used probably about three times as much as the oven, the matter assumes some importance, and most people will agree that the normal three-heat arrangement leaves something to be desired in the way of simmering temperatures at least, the practice of placing the saucepan, etc., partly on the plate to obtain the desired result being obviously wasteful.

Several manufacturers have, of course, to a large extent overcome the simmering problem by reducing the "low" heat loading considerably, and Hotpoint have gone a stage further in bringing out a four-heat "Torribar" plate with a special simmering load of 175 W.

Simmering, however, is only a side issue of the main problem: "Are three heats sufficient?" A demonstration of the new Tricity "Lokost" ten-heat hotplate control would probably produce an emphatic negative. In this ingenious device a balancing or regulating coil supplies current through two regulating switches to either or both of two hotplates (or one hotplate and one grill-boiler).

Only when the plate is used as a super-speed unit is it connected across the full voltage. With the switch at any of the other nine positions the voltage applied is suitably reduced, and in every position the whole of the plate surface is utilised. The heat losses in the balancing coil are claimed to be so small that it is almost impossible to measure them under working conditions. Not only is this arrangement said to effect a considerable saving in current, but the life of the element is prolonged and the housewife is said to appreciate warmly the added facility of control that is thereby made available.

But if ten heats are desirable, why not "go the whole hog" and have an infinite number, as in the oven? This is the logical conclusion of design and it would remove the last criticism that can be levelled against the electric hotplate. With this view in mind Sunvic Controls have recently brought out the "Simmerstat" (see September 2nd issue, p. 324), which, incorporating as its main components a potentiometer, a vacuum switch and a thermostat, obtains a continuous regulation of temperature from no load to full load.

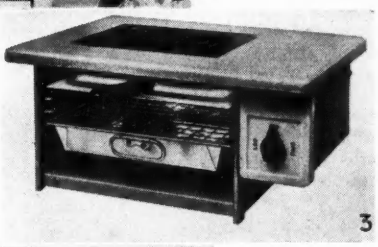


The Rubery Owen "White Knight"

One outstanding advantage of this device (as in the Tricity "Lokost" control, too) is that it enables single element plates with large cross-section wire to be used, thus making for long life. Moreover, for any load the whole of the plate is energised, as distinct from the usual small area in the three- and four-heat plates.

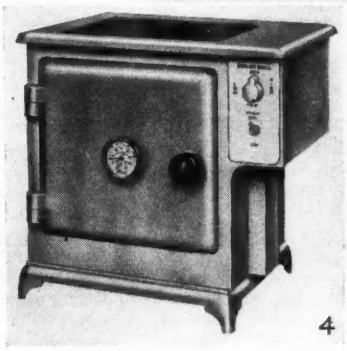
The thermal capacity of the hotplate is sufficiently high to produce a fairly constant temperature and the most satisfactory results are obtained with the radiant type of low thermal capacity, though the control can be used with any plate of up to 2-kW loading. Interference with radio is practically negligible. The "Simmerstat," which is suitable for either d.c. or a.c., fits easily into the space normally occupied by the three-heat switch and it will be marketed jointly by Sunvic Controls and Metrovick. Whether the cost, which will be a trifle more than an oven thermostat, will be justified by the public demand remains to be seen.

Regarding the hotplates themselves, recent developments indicate a leaning towards the radiant and transformer types, though most engineers appear to prefer the solid plate on account of its better characteristics for long-period use. It is, however, the quick heating up, the ability to see that the plate is "on" and the advantage of not requiring special utensils that count most with the housewife, who cares little about the residual heat of the solid plate.



3

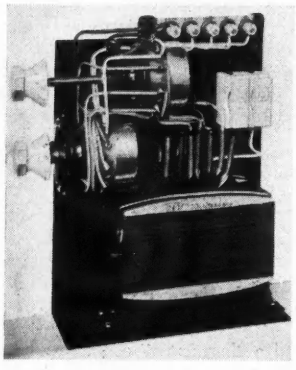
Perhaps the solution of the problem has at last been found by Jackson in the "Backer-Jackson" plate, which combines the advantages of the radiant plate with the cleanliness of the solid type, the cleaning and upkeep of the reflector being avoided. The improvements made to the formation and method of making the insulating material around the spiral enable the 8¼ in. by 6 in. plates to be loaded at 2 kW with perfect safety, while the very high pressure to which the tubes and castings are subjected enables a high rate of conductivity to be maintained. A new metallised finish is used on the Jackson grill-boilers, the Revo models also having been made rustproof.



4

After a lapse of many years, open-type plates are appearing

once again in quite large numbers, special care being taken in the new models to secure safety. Rubery Owen and Tricity are among those who use them. The popularity of the Revo "Superspeed" transformer plate continues to increase, and a new transformer plate, the "Ultraspeed," made by B.N.E. has made its appearance. Operating at 13 V and loaded at only 1,500 W this plate has an effective area of 7 in. diameter and its boiling times from cold using a 5½-pint pressed copper kettle are: ½ pint, 2½ mins.; 1 pint, 3¾ mins.; 2 pints, 6½ mins.; and 3 pints, 9¼ mins. It is interesting to compare these times with those given for other types in the ELECTRICAL REVIEW of



Switches and balancing coil for the Tricity "Lokost" controlled hotplates

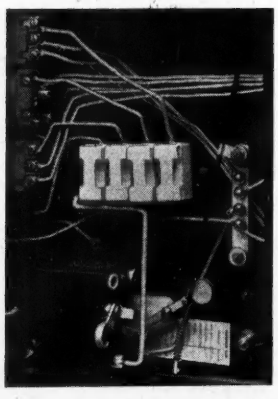
February 11th, page 193.

Interchangeability of hob equipment, etc., throughout the range of cookers is a policy much favoured by Hotpoint, Simplex and others, as assisting maintenance and replacement. The G.E.C. have gone a stage further in standardisation by introducing the "D.438" to take the place of the "D.334," "D.434" and "D.435," all of which catered for the normal sized family. While the price is maintained at the same as that of the smallest (the "D.334"), it has the advantages of larger oven capacity (11½ in. by 13¾ in. by 13½ in.), shelf runners pressed into the sides of the (earthed) removable oven for quicker and easier cleaning, all-rounded corners in oven and warming cupboard, an oven higher from the floor, non-tilting shelves, an inset thermometer, and an incorporated mains switch. Interchangeability of components with those of other models is maintained and to obviate obsolescence of older models the general appearance is unaltered. The oven loading is 2,250 W and thermostatic control is, of course, available.

Also possibly with a view to a reduction of the number of models later, Simplex offer the new "R.2945" cooker, which is described as midway between the "R.294" and the "E.295." This has the standard "R.294" oven but a larger hot cupboard and an extended hob giving accommodation for an additional boiling plate 6½ in. in diameter. The oven dimensions are 13 in. square by 12 in. deep, with a loading of 2 kW.

Ease of cleaning the interior is still one of the strongest selling points of a cooker. The removable box type interiors, as employed entirely by the G.E.C. and in all models but one by Hotpoint, are much in favour, though the most recent types of fixed interiors fitted by Rubery Owen (cylindrical design), Siemens, English Electric and others are so designed with rounded corners and no crevices that cleaning could scarcely be simpler. Revo cater for both demands and so do Elexcel, who, in addition to the "Xcel EH381" fixed interior model already mentioned, have brought out two removable interior models.

An ingenious compromise adopted by Simplex is the three-piece interior which can be readily removed for cleaning, while in an emergency the bottom plate of the Carron "Carronade," which controls the heat circulation, can be taken out to increase the oven capacity. With regard to the technical side of oven interior construction, the fixed interior offers the advantage of the easier adoption of the plug-in type element. This is not, however, a very important point to-day, since the robustness and reliability of the modern element renders replacement an infrequent occurrence and in any case the removal and replacement of a fixed element takes only a few moments.



The "Creda" main switch

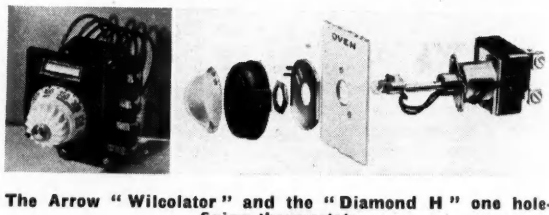
Cookers finished in colours are still generally regarded as a luxury for which the purchaser must be expected to pay extra, the mottled grey or similar finish being considered suitable for most situations. No one will, however, deny the appeal of the coloured finishes such as Moffats have standardised for many years, and that other manufacturers appreciate this fact is indicated by a step taken by the G.E.C. in introducing as standard green and ivory, and two-tone ivory finishes. Grey and pink, blue and white, and green and white are new finishes now provided by Jackson, who are also marketing an all-white cooker with a chromium top.

The restricted size of the kitchens in so many of the modern houses and flats has resulted in a considerable demand for the small cooker which takes up the minimum of room but provides the maximum cooking space. Almost all manufacturers now make such models, recent improvements centring mainly on giving as many of the facilities of the standard cooker as possible without increasing either the size or the price.

The cooking space in all models is very much the same but Siemens claim in their "Minor H.300" model to secure a few extra square inches by employing plug-in type side elements, which, incidentally, simplify cleaning. The lagging of this cooker (which has been applied to the deflector plate too) is the same as that used on the company's larger models and there is a handy shelf beneath. A thermometer has been incorporated in the door and this is a recent addition to the G.E.C. "Minor" also.

A warming cupboard loaded at 80 W is provided below the oven of the Revo "Coronette," while Falk Stadelmann fit a warming drawer in their "Flatlet Senior," which, among other refinements over the "Flatlet Junior," has a separate boiling plate instead of a grill-boiler. All unnecessary projections have been eliminated in the English Electric "H.C. 210" and the latest finishes of the Hattersley "Swinton No. O/27" include in attractive combinations green and cream. The popularity of the "Baby Belling" has caused its makers to bring out a similar model, slightly larger in size and having a boiling plate as well as a grill-boiler.

A performance fully equal to that of their standard cookers enables the Creda "Unit" cooker to be fitted with thermostatic control, if desired, special care being taken to ensure



The Arrow "Wilcolator" and the "Diamond H" one hole-fixing thermostats

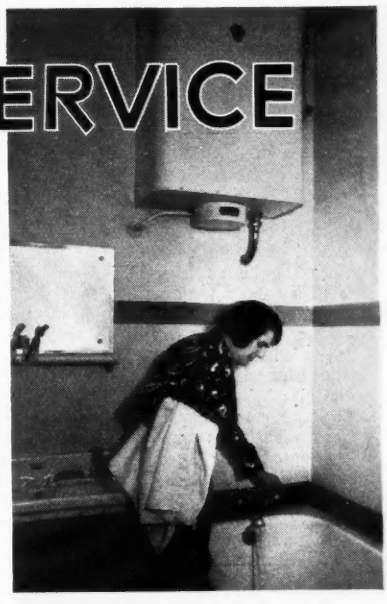
the efficiency of the lagging arrangement. As the name implies, the cooker can be supplied in three distinct units—oven, grill and legs. Either the grill or the oven can therefore be bought separately and if required as a single unit can be mounted (by means of two-screw fixing) one above the other or side by side, the set of four legs being added if additional height from the ground is required.

Breakfast cookers continue to be sold in large quantities. B.N.E. who tell us that they alone have sold over 70,000, are emphatic in their preference for the radiant plate for this type of apparatus, speedy heating up being one of its first essentials. Either radiant (1¾-kW) or solid (2-kW) type plates can be fitted to the new English Electric models. The solid type plates embody a new and simple form of construction providing a reduction in weight, somewhat quicker heating up, better radiation and easier maintenance. Breakfast cookers with separate grills and boiling plates are made by Carron, Hattersley and others, and a new and pleasing design of switch is a feature of a recently introduced Hotpoint model.

Of particular note among portable hotplates the London Aluminium Co.'s "Diamond No. 560" model, though designed primarily for cooking, can be employed equally well as a portable radiator. Units with either "Torribar" or open type elements are now supplied by Hotpoint, while the Brown Bros. "Duco" model is remarkably strongly constructed for its low price. Revo have oval and totally enclosed models and to facilitate carrying the C.W.S. market a "Dudley-Electric" hotplate fitted with handles. Somewhat more elaborate are the Electrical Commodities "Samson" units.

Several new warming plates have made their appearance. For quick heating up a Hedin model has been fitted with two heating elements and the largest of three Bulpitt units (available in either chromium plate or polished aluminium) has three-heat control and a 3-pin plug, making it possible to use a toaster, percolator, etc., at the same time. Other attractive models are made by Arora, S.L.R., Siddons, Vidor and L. G. Hawkins. A Bertram Thomas "electric buffet," a dinner wagon with a hotplate top and an electrically heated cupboard, is supplied in wood and colour finishes.

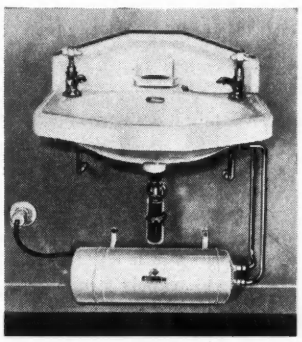
Hot Water Service



A very profitable load awaits electricity supply undertakings, which are prepared to grant special tariffs for water heating, and manufacturers are looking forward to general agreement soon upon the type of apparatus required.

THE gradual slowing-down of development in the water-heating manufacturing field that we have referred to during the past few years continues, and the reason for it is obscure. At least one important manufacturing organisation has ceased the production of water heaters entirely, and generally there is not the activity of even a few months ago in the introduction of new schemes for overcoming such outstanding problems as furring. It is true that sufficient progress has been made with most of the problems to ensure efficient and satisfactory service, but we cannot believe that the commercial position is so highly satisfactory to the manufacturer that he can afford to slacken his competitive efforts in the quest for improvements to his equipment.

Where, then, does the trouble lie? Maintenance of water-heating equipment is not a serious economical problem, the supply engineer tells us, and where water heating is tackled in earnest it is shown to be a profitable load. We are led to believe that the manufacturer is waiting for the supply authorities to make up their minds as to what they want.



An Eltron under-basin equipment

Comparatively few undertakings are yet prepared to grant special tariffs for the encouragement of water-heating. A general move is expected at any time, but the manufacturer asks: Will the call be for storage or geyser-type equipments, for the small or large unit, for off-peak or 24-hour loading, or even for automatic or hand control? The production of a water heater is a highly specialised job, which demands a greater knowledge of the potential market and more co-operation than does the production of other classes of domestic electrical equipment.

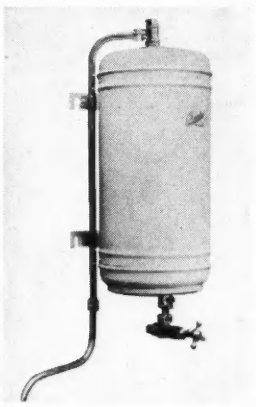
The "Belberry"

But lest the foregoing should suggest to the reader that things are at a standstill we hasten to show that some manufacturers are alive to the problems and have quite definite and important developments to report.

One of the biggest influences on modern water-heating equipment design is the public call for reduced dimensions. The S.E.B. equipment of Heatrae, Ltd., is made specially to take up a minimum of space in the bathroom. It is intended for use mainly as a supplementary bath-water heater, working quite independently of a possible existing hot-water supply from a boiler served by a fire. The hot water is discharged through a separate spout or it can be connected to a special outlet bib in line with the cold-water tap. Rectangular storage heaters introduced by Falk, Stadelmann & Co., Ltd., have very small projections—9½ in. in the case of the five-gallon model.

The D-shaped heater of the Geyser Manufacturing Co., Ltd., projects only 9½ in. for the 9-gal. model and 10 in. for the 12-gal. unit. The angle-pattern or corner-fitting equipment is excellent from the space-saving point of view. The horizontal cistern heater of Johnson & Phillips, Ltd., is fitted to the ceiling and so conserves valuable space.

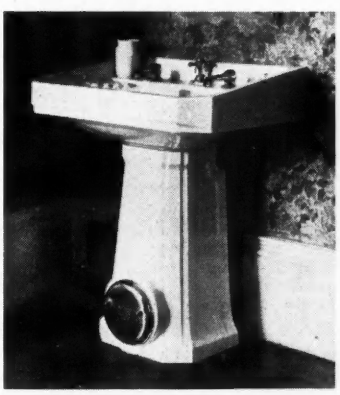
Another big influence is the demand for quicker heating of water. The low-load automatically controlled storage heater has always been acknowledged as the ideal equipment for the supply authority, and it has been developed along highly scientific lines. The call for quicker heating led first to a number of schemes by which very small quantities of hot water could be obtained quickly—shaving water, for instance. Then the demand came for much higher loadings, so that larger quantities could be heated up much quicker, and this usually meant dispensing with the thermostat. Now with the higher-load concessions, there is a revival of the call for heaters on the geyser principle. That, we suggest, throws some more light on the partial arrest of development to which we have referred above.



"Creda" top-outlet water heater

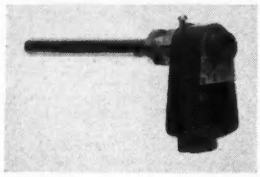
One of the new heaters which aim at the geyser principle is the "Constant Hot Water" unit introduced by the Hotpoint Electrical Appliance Co., Ltd. It is loaded at 4 kW and consists of a vertically mounted cylindrical water chamber employing an immersion heater element of novel design working in conjunction with an automatic pressure switch and giving an immediate and constant supply of hot water. In the "Auto-Heater" of Thermics, Ltd., the temperature is regulated by the rate at which the water is drawn off. The electricity is controlled by a patent "hydro-electric" valve which is brought into operation by the opening or closing of the hot-water draw-off tap.

The DS8 1½-gallon water heater produced by Eltron (London), Ltd., is also designed to give a practically continuous supply of hot water. It has upper and lower heating elements which cannot both be switched on at the same time. They automatically operate alternately and the upper contents of the tank heat up from cold within 10 minutes.



"Reymez" wash basin in a hotel

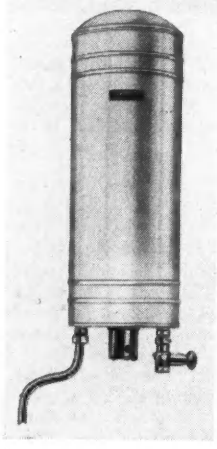
The following is a selection from the high-loading equipments which are now available. The 3-gal. and 5½-gal. cylindrical G.M.C. heaters are loaded at 2 kW and the 9-gal. and 12-gal. sizes in all three patterns—angle, D and circular—are loaded at 3 kW and 4 kW respectively. The 2-gal. "Rapid" heater of Archibald Low Electrics, Ltd., is loaded at 1.5 kW and there is also a 4-kW model (12 gal.). The object is to produce hot-water only when required and where there might be long intervals between the periods of draw-off.



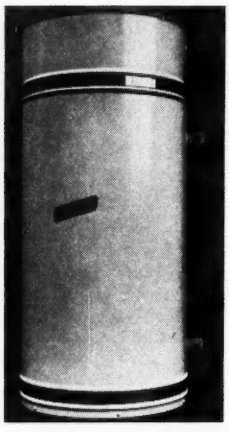
British Thermostat "IT" thermostat

The standard "Efesca Quick Service" heater is designed for manual control by a three-heat switch. It holds 12 gal. and is loaded at 4 kW, and a 20-in. circulator is fitted vertically from the bottom. There are a ¾-in. inlet pipe with a stop valve and a ¾-in. outlet pipe with an anti-siphon dome and a swivel swan-neck spout. The "Rapide" heater of Drake & Gorham Wholesale, Ltd., consists of a copper tank with a movable lid and it operates on the "push-through" principle, having a non-return device on the inlet. The "Rapid" heater of Ferranti, Ltd., has been designed for bathroom service at low initial cost.

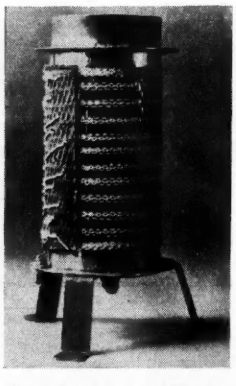
The idea behind low loading density of creating a low surface temperature over a greater dissipation area has now become an almost generally accepted scheme for scale prevention. To this end Hedin, Ltd., have adopted the method of fixing the heating element to the outside of the vessel containing the liquid, so as not only to avoid scale formation, but also to obtain efficient circulation of the liquid. "Highlow Looprod" elements with a greater heating surface to operate at a lower temperature have been developed in top- and side-entry patterns. The side-entry element doubles back, so that within an immersed length of 13½ in. there is a loading of 2 kW. At the bottom of the top-entry unit the "rod" is coiled, so that the load and consequently heat concentration avoids overheating at the top of the tank. The new top-outlet 1½-gallon storage heater of Simplex Electric, Ltd., is intended for use in districts where exceptional hardness of the water necessitates frequent cleaning of outlet pipes. The top outlet ensures a steady flow of water with the minimum amount of disturbance to the bulk of hot water in the tank and it therefore diminishes the rate of precipitation. A move to overcome the troubles caused by varying water pressure is the introduction of an automatic water pressure regulator by Santon, Ltd. The Ferranti hairdresser-type heater permits variation of temperature by a mixing valve.



The "Efesca Quick Service" heater



A "Highlow" anti-scale heater

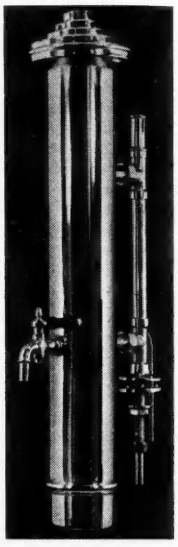


The Hedin exterior element scheme for low surface temperature

Now that the public demand for hot and cold water supplies in the bedroom has been extended to the boarding house there is an answer to the difficult problem associated with this in the domestic water-heating equipment field—the under-the-basin heater. Pipework and costs are reduced to a minimum. In a "Highlow" outfit the heater is enclosed in a finely constructed wood Shanks' cabinet measuring 25 in. by 18 in. by 34 in. high in the case of the medium-size model. The heater is a two-gallon model loaded at 750 W and is thermostatically controlled. When the hot-water tap in the basin is opened cold water enters the storage heater and displaces the hot water drawn out through the centre nozzle. The outlet connection from the heater is always open to the atmosphere. The "Reymez" wash basin (A. Reyrolle & Co., Ltd.) has a heater of about 2½-gal. capacity housed in the pedestal.

The Eltron under-basin water heater is of ¾-gal. capacity, loaded at 500 W and is available in non-pressure and pressure types. The former is said to be particularly economical as only those heaters in occupied rooms are in operation. Existing wash basins and fittings can be used, the only alteration necessary being the changing of the hot-water tap for the special tap supplied.

In a Thermics outfit the incorporation idea is extended; it includes a bath, basin and an overhead feed tank, all in an attractive surround, and a 30-gal. thermostatically controlled storage heater. Cold-water supply can be laid on to the set direct from the main or from a tank service, while an expansion pipe is unnecessary. Considerable saving is effected in fixing costs as the duplication of hot and cold supplies and waste pipes is avoided. The 1½ gallon non-pressure thermal-storage heater is also playing a part in the solution of the boarding-house problem, but, as Santon, Ltd., say, it has assumed an important place in all schemes for the popularising of electric water heating. In a new model produced by this company there is an efficient non-drip, a quick cut-off, low wattage density and sensitive thermostatic control.

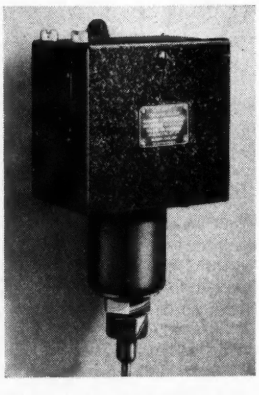


The "Santon" bar heater and boiler

We find that the terms "non-pressure," "pressure" and "cistern" in relation to the three main classes of water heaters are still not well understood in many quarters, no doubt on account of the continued use of the terms "push-through," "displacement," and so on. We hope, therefore, that the following brief explanations from the descriptive leaflets of the English Electric Co., Ltd., will help to make things clear. The non-pressure heater is suitable for direct connection to the water supply mains and for supplying hot water at one free outlet only. The hot water flow is controlled by the cold-water inlet, the hot water being forced out. Pressure heaters are connected to existing ball-valve feed tanks and can supply a number of closed taps. The cistern heater incorporates a separate self-contained ball-valve tank and is thus suitable for use where the cold-water supply cannot conveniently be obtained from the existing feed tank. An expansion pipe forms an intergal part of the design.

In the J. & P. improved cistern heater it is not necessary to empty the hot water container. Instead the water is run out of the heating chamber by means of a drain plug fitted on the apparatus plate.

The ELECTRICAL REVIEW has always strongly advocated closely associating water heating and cooking, and where, as at Wimbledon, such a policy is adopted, outstanding success is achieved. The mere tinning of the interior has made many a heater a "cooking unit" and this applies particularly to the 1½-gallon type. Of equipment specially designed for both water heating and cooking there is the "Queen Bee" of Nelsons (Preston), Ltd. It has an automatic boiler with positive control of boiling water at will, a hot-water circulator which supplies any point in the home, and steam cooking facilities. The Santon bar heater and boiler is a narrow cylindrical unit which is simple in design and operation and easily installed. It occupies very little room and can be put to many uses in the home. Strictly speaking, the table immersion heater is also cooking equipment. Two circular loop models of the General Electric Co., Ltd., are loaded at 300 W and 500 W, respectively. In the bar heater produced by Ferranti, Ltd., water is drawn off from a pipette nozzle, allowing extremely small quantities to flow.

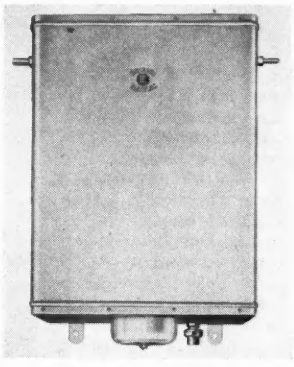


Rheostatic "PS" pressure switch

The partial arrest of development which we have mentioned has not occurred, at any rate to the same extent, in the case of the immersion heater for conversion schemes. There is a tendency to make such heaters longer, and Hotpoint say that their immersion heaters are now available up to 36 in. long. Siemens Electric Lamps & Supplies, Ltd., have introduced a range of automatic circulator-type immersion heaters in lengths up to 42 in. The thermostat has a long stem to give close temperature control. Cleaning is facilitated by the easy removal of the circulator tube. The "Dragor" (Drake & Gorham) immersion heater and circulator which is available up to 42 in. long can be quickly converted from an

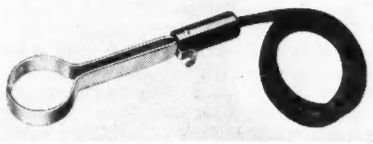
immerser to a circulator by means of three clips and three curved blades which afford both efficient circulation and quick removal for cleaning.

More attention is being given to the external circulator. The new external circulating pipe of Aidas Electric, Ltd., will interest all who have to fit immersion heaters into hot-water systems with indirectly heated calorifiers. Fitting such calorifiers with the ordinary top-entry circulator necessitates a special angle flange to keep the elements vertical, but this presents a difficult problem because the tanks vary in shape and size. Standard lengths of the external circulating tube are 24 in., 28 in., 32 in., 36 in. and 42 in. between flow and return connections. Models with 2- or 3-kW loading are available. The G.E.C. external circulator is connected to the side of the storage tank by short pipes, and provision is made for readily varying the length of the "flow" pipe, so that only one size of circulator is necessary for attachment to any storage tank from 20 to 50-gal. capacity.



English Electric 20-gal. cistern heater

One of the problems associated particularly with conversion schemes is the provision of efficient heat insulation on existing tanks. Mattresses such as those supplied by the Arora Co. provide one solution. They are available in widths of 7 in. and 4 in. and about 30 in. long to afford a lagging thickness of about 2 in. They are supported with tapes which can easily be tied round the top expansion pipe, thus allowing such projections from the tank as water pipes and immersion heaters to pass through the vertical divisions. Two half-circular mattresses are placed over the top of the cylinder and the vertical ones are finally strapped into position by three buckled webbings.

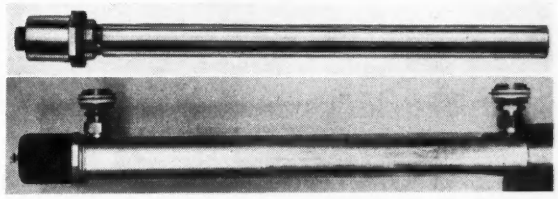


G.E.C. "table-cooking" immersion heater

A simple but ingenious device for facilitating the fixing of immersion heaters to existing tanks is the "Dragor" fixing flange. The spigot flange is "split" and the V slot is threaded past the hole until the rest of the flange can be inserted before being withdrawn from the "split" on the inside of the tank.

"Dragor" immersion heater fixing flange

There is an increasing tendency to install in large blocks of flats central water-heating installations so that there is overlapping both with regard to the ingress of "commercial" equipment into the domestic field and to the use of water-heating equipment for both domestic hot-water supplies and space heating. Unfortunately, the electrical industry is not getting the share of this class of business that its superiority entitles it to, but the services of the electrical control-equipment manufacturers are called for in any case. The P.S. pressure switch of the Rheostatic Co., Ltd., embodies a "Satchwell" micro-gap switch, thus avoiding the use of fragile mercury tubes; pressure setting over a wide range by the simple turn of a knob which can be locked; and adjustment by an external knob of the operating differential, so that either very close control or relatively coarse control can be used, while the adjustment does not alter the set cut-off pressure. This robust device is available either for mounting directly on the boiler or at a distance on a wall. It can be supplied in three ranges for pressures up to 20 lb., 60 lb., and 150 lb. per sq. in. The "IT" thermostat of the British Thermostat Co., Ltd., is largely used for the control of electric water heaters. The bi-metal element is of spiral form and imparts rotary motion to the shaft on which is the switch arm.



Siemens automatic circulator-type immersion heater and (below) the Aidas external circulating pipe

Some of the smaller apparatus referred to in the "Cooking Equipment" and "Other Useful Appliances" Sections

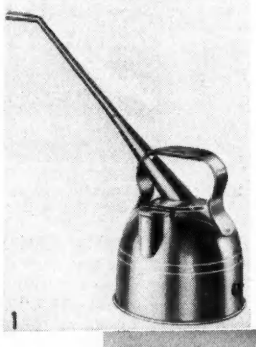
1 to 4. G.E.C., "Creda," Elcap and Best Products "Monica" kettles. 5 to 7. Ormond, Sloan "Summit" and Falk, Stadelmann "Standard" toasters. 8 and 9. B.N.E. "Ultraspeed" and "Backer-Jackson" hotplates. 10. Electrical Commodities "Samson" 3-slice toaster. 11 to 13. Vidor, Arora and Bulpitt warming plates.

HEALTH APPLIANCES

Electrical aids to fitness have not lately changed in principle, though the construction of electro-medical equipment in general is being improved. Ease of control and safety in handling are being attended to more closely.

OF the electro-medical appliances expressly intended for household use, those most generally employed are radiators of light rays, either luminous or invisible, sometimes combined with heat. The newer form of ultra-violet lamp, or so-called quartz burner, is really a discharge tube containing a very minute quantity of mercury and, being self-starting, does not need to be tilted to be set into operation. One of the latest in this class is the recently introduced Philips "Biosol," mounted in a metal reflector having a series of facets, the intensity of emission being very uniform. The incorporation of an appropriate glass filter to restrict the radiation to the range of shortest wavelengths in the solar spectrum permits this lamp to be employed for the treatment of ailments for which natural sunlight is beneficial.

Similar in principle, but not in form, are the "Hanovia" range of table and pedestal lamps with adjustable parabolic reflectors and the "Duotherapy" outfit which furnishes either u.v. or infra-red rays as required.



These lamps require to be connected to the mains through a special regulator device, which is housed in the base of the reflector stand, whereas the Thermal Syndicate's portable "Vi-Tan" outfit is built into a wooden carrying case with a hinged door. In this case the discharge tube is of inverted U-shape, with a vertical parabolic reflector. It is of 50 W for a.c. 200-250 V. The Lumsden range includes a metal cabinet model of 500 W supplied for a.c. or d.c. at 200 to 250 V. The discharge tube is within a recessed bowl reflector that has a circular hinged front cover. Below is a switch and press button for starting and a compartment to hold goggles and flex connector. The portable pedestal lamp is of 250 W for d.c. only at

1. G.E.C. bronchitis kettle. 2. Watson infra-red radiator in use. 3. A.E.G. heating pad

50 to 250 V. It is of the vacuum quartz type and is started by tilting the bowl reflector.

The G.E.C. ultra-violet lamp is for a.c. only, operated from a transformer of special design housed in the base of the floor standard, which is adjustable for height and angle. The reflector accommodates an "Osram" 400-W bulb that differs from all others. It contains a globule of mercury and two tungsten electrodes across which an arc is formed, together with a short filament for ensuring the automatic striking of the arc. The greater part of the radiation comes from the incandescent electrodes, while the ultra-violet rays radiate from the arc stream between them.

As a complement to this lamp the G.E.C. and Watson infra-red radiator of 200 W is for direct connection to either a.c. or d.c. mains. The element is interchangeable with a radiant-heat bulb.

The "Raysol" is one of the more recently introduced health lamps, low priced and for direct connection to d.c. or a.c. mains. It is of the bowl reflector class, combining a heating coil and two therapeutic carbons between which an arc is formed, emitting both visible and ultra-violet rays. The arc is automatically extinguished after a definite period of exposure. Another double carbon-arc sun lamp intended for use in the home is the Taylor "Compet," which emits both ultra-violet and infra-red rays.

The Calvete hand lamp is intended more particularly for treatment of the scalp with dry heat emitted from an "Icalite" bowl reflector, which will accommodate either a 200-W carbon filament bulb or an infra-red heating element. For more general treatment there are Cox-Cavendish "Duplex" lamps of several sorts fitted with a screw-cap holder to take an infra-red bulb of the short-wave class, or a long-wave non-luminous heater element. The aluminium reflector is designed for use as a hand lamp or for clamping to an adjustable extension arm.

The General Inductance Co.'s hand, table and floor standard radiators are fitted with "Giplex" heating cones of two types, one producing long-wave rays for deep penetration and the other medium waves for use when quick erythema is desired. The reflectors are of special shapes for correct beam projection.

A product of the Kniveton Cable Works is a battery torch designed to project a pencil of light into cavities, and useful for examining the mouth and throat.

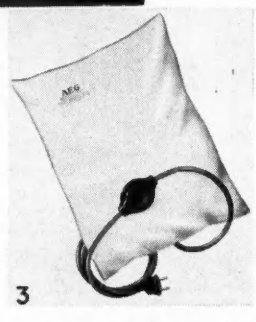
Therapeutic lamps and electric pads of various makes are also obtainable from the Medical Supply Association, the Sun Electrical Co., Commercial Electric Co., Falk, Stadelmann & Co., and Electrical Commodities, Ltd.

Blankets and Pads

All the functions of the hot-water bottle can be performed by electrically heated pads and blankets, more soothingly and with the added advantages of constantly maintained temperature and flexible conformity to body shape. They are made for direct connection to a.c. or d.c. mains and waterproof covers are usually obtainable at extra cost.

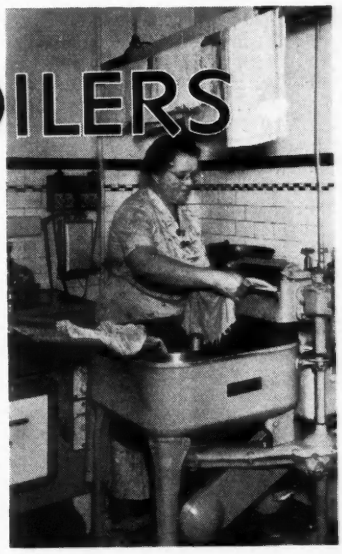
The Bulpitt standard pad measures 16 in. by 11½ in., has a switch for selecting three different maximum temperatures and four embedded thermostats for protection against overheating. The 14½ in. by 12 in. size has two thermostats only, the washable covers being variously coloured. The Hawkins "Supreme" is similarly controlled and supplied in an assortment of shades, while blankets are 44 in. by 32 in. in dimensions.

The "Thermat" blanket bed warmer is unusual in that the heating element is part of the fabric, which is of the open weave type. It is manufactured by Catena Fabrics, Ltd. (A. C. Harris patents) and is so pliant that it can be rolled up or folded to form a pad. A fuse provides additional protection to thermostatic control. The element consists of 500 yd. of fine copper wire, enamel insulated and covered with fine cotton and then coiled round a yarn foundation. It is then wrapped in a cotton yarn and finally embedded in a knitted fabric of the same weight and flexibility as an ordinary blanket. In contrast to a shorter length of high resistance wire, the copper element becomes little hotter than its surroundings and the method of construction avoids weakening by tension and crushing.



A feature of the standard "Milliwatt" pad is the "connectorless" element which avoids the use of rubber-covered flexible cords leading into the heated area, and so minimises risk of breakage and arcing. Rubber outer covers are abolished by the introduction of "shower proof" cotton materials and the loadings of 30, 50 and 80 W are the same as those of the

Washers & Boilers



A survey of modern electrical appliances for coping with the weekly wash reveals that a number of interesting variations in agitation methods have recently been introduced and that washers are now being made which are fitted with water-heating elements. Many refinements are also noted in the designs of wash-boilers, drying cabinets, ironers, etc.

NOT so long ago clothes boilers seemed to be receiving more attention than was being given to washing machines, but lately the latter have claimed renewed consideration. In the models introduced during the past few months there is evidence of originality in design and several washers are now available fitted with water heating elements, which help to increase their load-building value. This useful addition is essentially English, it being an almost unknown practice in the United States and Canada where, incidentally, the prevailing shape is cylindrical whereas rectangular cabinet machines are making their appearance in increasing numbers in this country and latterly there has been a tendency to add heating elements to the washing tub. Coloured enamel finishes are general, while the prices of some of the smaller sizes have been reduced.

A recent innovation in the case of the "Hotpoint" machine of B.T.H. manufacture is its installation for communal use in a large block of municipal council flats in London to give the occupants the benefits of electric washing.

The "Bar-Spot" is a Barker & Turner departure from the constructional principles hitherto followed. It is of flat-top cabinet form on four short legs without castors, and the lid is hinged over on to two struts to form a rinsing tray, the wringer being arranged to fold down underneath it. The 0.25-h.p. motor is provided with the usual speed reduction gearing, but the agitator is fixed to the bottom of the tinned copper inner tank, which is oscillated electrically on a ball-bearing turntable, thus avoiding moving parts within the tank. The whole agitator unit can easily be removed, leaving the tub free for boiling clothes, while by placing a plate on top of the agitator vanes this washer may be used as a steamer. The 500-W "Chromalox" heating elements provide alternative loadings of 1, 2 and 3 kW and the tub holds from 6 to 8 lb. of dry clothes.

G.E.C. wash-boiler

Another interesting machine now made in England is the "Cotto," with a square top covering a well specially shaped to prevent water dripping from the cover on the floor.

The wringer has a safety release in addition to the normal switch. The agitator is motor actuated by movement of a handle protruding through the top which causes a peculiarly shaped paddle to revolve and, at the same time, rise and fall; its four vanes are of inverted "V" section, intended to create suction. Removal of the agitator leaves the stainless steel tub, which is rectangular inside and out, completely free from internally protruding parts and three-heat elements are incorporated to raise the temperature of the water to 140 deg. F. in about an hour. A draw-off tap is fitted.

The latest Drake & Gorham Wholesale washer has a square body, two heights of castor feet being obtainable. The welded frame is encased in sheet steel and the 12-gal. pan is nickel-plated internally. The emptying tap is of the screw-down plunger type, while the agitator has three semi-rotary paddles and can be lifted out for cleaning. The 0.25-h.p. motor drives direct through a rack and pinion with spline clutch action and the gear bath contains a quart of oil. The motor switch is separate from the two foot-press Tucker switches incorporated for three-heat-control when 3-kW elements are added (at extra cost) to heat the water from cold to 140 deg. F. in 20 minutes or boil it in 55 min. The 12-in. rubber wringer has Duralumin gears and is interchangeable with an ironing attachment loaded at 1,150 W and having a switch and indicator lamp in the driving head.

Recent Toubkin introductions to the British market include "Blackstone" washers with what is described as a "hydrac-

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Health Appliances (*Continued from preceding page*)

de luxe model in quilted satin with a silk flex, and elegant switch. The inexpensive "Minor" in flannelette is loaded at 16, 32 and 65 W, the 30 in. by 50 in. blanket has six thermostats and 140 W loading, while the 100 W "Sun Kwilt" is available for single and double beds, it being filled with lightweight down and covered with quilted crêpe satin.

Thermega pads and blankets are made for normal and all sorts of special requirements, and for both a.c. and d.c. at from 25 to 250 V. There are also the Runbaken "Cosybed" warmer and the A.E.G. pad of 16 in. by 12 in. size loaded at 60 W.

Stimulators

Electrical stimulators, more commonly known as violet-ray outfits, but not to be confused with ultra-violet ray lamps, consist of a non-rotary generator of high frequency for universal mains use. The output is regulated by turning a knob and the applicator electrodes are evacuated glass tubes of many shapes and forms, which glow violet when the discharge takes place through them. The Calvete "Everay" sets in handy carrying cases have bakelite electrode handles, and the generator, too, is encased in bakelite.

The Cox-Cavendish set weighs 5 lb. and is described as "earth free," while Brown Brothers' model consumes 25 W and is suitable for 100 to 250 V mains operation. The same voltage range applies to the several Hawkins "Vio-Ray" models, the largest of which has extra control refinements.

Small vibro-massage machines, supplied in convenient carrying cases, consist of a high-speed hand motor with a protruding shaft to the vibratory tip of which variously shaped sponge- and rubber-capped applicators are fitted for facial, scalp, and general treatment. The Calvete motor weighs 4½ lb. and is fitted with a switch and speed regulator. Brown Brothers' outfit is of similar weight. The Hawkins' machine has a perforated outer casing, as have also the 40-W Gilbert vibrators. One of the last-mentioned is 7¼ in. by 6 in. in size and attached to a wooden handle; the other measures 6 in. by 4 in. by 3½ in. and weighs 2 lb. 4 oz., being a complete departure from the ordinary type. It is designed to be strapped on the back of the user's hand, so as to impart a vibratory motion to and through the fingers when making massage strokes.

Then there is the G.E.C. electro-mechanical stimulator motor, arranged to be fixed to a table or (at extra cost) on a floor pedestal. The machine is double ended, the eccentric drive imparting a vibratory motion to a non-rotating belt that is loosely wrapped round the user's body or affected limb needing exercise.

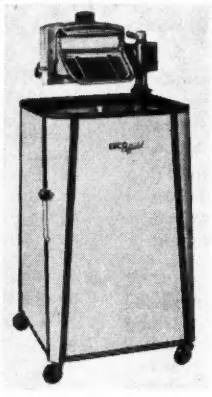
The 6-pt. Bulpitt bronchitis kettle is made of copper, either polished or chromium plated, and has a long spout with a steam diffusing nozzle. The two-heat element is loaded at 500 and 1,800 W and a capsule safety device will afford protection should the kettle accidentally be allowed to boil dry in continuous service. In addition to a moulded filler cap, the lid is large to permit the interior of the kettle to be easily cleaned.

The G.E.C. kettle is also made of copper, but is of four pints capacity and its loadings are 400 and 800 W. A two-heat switch is fitted into the body so that the full heat needed for quick starting can be reduced to half when the contents have commenced to boil; a cut-out fuse is incorporated.

tor" action. Helical-gear drive and a motor mounted on rubber are employed. The more expensive models have motor-driven pump drainage and a Lovel-type wringer with side-bar safety release; it is fitted with a visual indicator of pressure, which can be controlled to suit different fabrics. The "K1 Spinner" model has two round tubs, the smaller being a centrifugal water extractor, which obviates the need for a wringer and enables one 9-lb. load to be rinsed while another load is being washed.

The H.M.V. range is streamlined in appearance, the three-vane aluminium agitator being cadmium plated. The 12-gal. size has a turn-screw drain and the 14-gal. machine a motor-driven pump, while the wringer has a one-piece head with semi-soft rollers, the pressure of which is adjustable. No extra charge is made for d.c. machines.

Uncommon spiral, two or four vane agitators are fitted to the "Apex-Vactric" range, the latest models being listed at slightly higher prices. One is enclosed down to the castors, concealing the legs, and both the agitator and motor pump are controlled by foot pedals. The pressure of the Lovel wringers is adjustable and there is a twin tub "spin-dry" type incorporating a centrifugal water extractor. In all cases the chassis are electrically welded.



Ekco-Coffield cabinet

This company's cheapest washer is priced at less than half the average; it has a ⅛-h.p. motor and hand wringer, the canister being removable from the folding base for convenience in storage.

The height of the less expensive Beatty machines (Canadian) is adjustable. The wringers have screw-down adjustment with reversing lever and are interchangeable with roll ironers. Model "2A" first appeared this year with a seamless tub and the "SB" model was one of the first to be marketed in this country with a stainless steel tub, with a deep sediment zone beneath, held in a welded frame with streamlined legs.

Falk, Stadelmann

The "Bendix" is unusual in several respects. The totally enclosed cabinet of smart style has a circular glazed door in front through which the soiled clothes are inserted dry. The time and temperature controllers are set as desired and water flows into the cylinder; soap is added and the contents are kept tumbling in the suds for the required pre-soaking period, after which the dirty water drains off and the machine stops, all these operations being automatic. Soap and blueing are next added and the clothes are washed and the water drained off. Three separate rinses are given, while fresh water is sprayed in and drained off after each rinse and the clothes are finally spun until damp-dry, again entirely automatically. There is no agitator; instead, the cylinder revolves, carrying the contents up and down. The motor is of the standard 0.25-h.p. type, the controls for class of fabric and timing being rotary and clearly marked. Temperature is regulated by thermostat and the valves for hot and cold water inlet and outlet drain are also electrically controlled. Inlet hoses attach the machine to hot and cold taps and the drain hose is hooked over the edge of the sink.

Veritys

One of the cheapest washers available is the "Goblin Popular," which has a hand wringer arranged to fold back for convenient storage, and a tubular frame without castors. The more expensive model is provided with a safety guard on the wringer which simultaneously switches off the motor and releases the pressure on the rollers. To avoid entanglement when wringing the agitator can be lifted clear; it has an uncommon inverted action.

The C.W.S. "Dudley" is rectangular and enclosed down to castor level, a brake being provided to hold it in position while in use, and there is also a pilot light. The starting lever for the wringer automatically controls the drip tray, while in the lower portion of the table top cabinet is space for storing the wringer, which is interchangeable with an ironer.

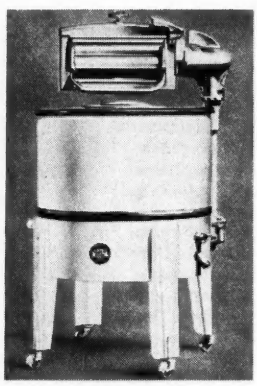
The "Spartovac" sold by Electrical Commodities, Ltd., has a horizontally corrugated tub made of enamelled "Armco" iron with a cushioned rubber top and welded frame. The agitator is removable and makes 58 strokes per minute with a five-eighths turn.

One of the "Niagara" models now being distributed by Electrical Components, Ltd., has a pump driven by friction from the "Delco" motor of 0.25 h.p. The direct drive mechanism embodies steel cut gears in a permanent oil bath, and a special wringer is available with a safety feed and a one hand re-set and push-bar release device.

The Falk, Stadelmann washer has been redesigned and its colour changed, the wringer being interchangeable with a 26-in. roll ironing attachment.

The G.E.C. machine is claimed to wash a tub full of clothes in six minutes. Its loading is 250 W and the wringer is interchangeable with an ironer loaded at 1,150 W and having a pilot lamp.

The five models involved in the recent agreement between E. K. Cole, Ltd., and the Coffield Washer Co., Ltd., of Canada, employ off-set blades to push water through the clothes rather than striking agitators. The oscillatory action is over 180 degrees, 110 per minute, the four blades thus causing more than seven strokes per second. Model "SB" is of 14-gal. capacity, taking 10 lb. of dry clothes. Model "B" is a luxury version, having a sediment zone in the base with a push-bar safety release on both sides of the wringer and a switch on the skirt. The main feature of the cabinet model is that the gear-box and wringer can be detached for stowing away in a cupboard at the base. It has an enamelled table-top, and the air-gap between the inner and outer walls of the tub provides a useful degree of heat-insulation. The wringer has a pressure indicator for "linens, woollens, silks," and an automatically reversing water shutter. Model "M" is of special bowl-bottom construction, so that the clothes roll over rather than oscillate to and fro. The arm-level safety switch is mounted at the top of the tub, and a filling and draining tube is supplied with this model at no extra charge.



H.M.V.

Model "M" de luxe holds about 12 lb. of dry clothes and about 16 gal. of water. A timing switch can be set automatically to regulate the duration of the wash, the agitator being switched off at the end of the pre-determined period. All "Ekco" drives are by machine-cut gears immersed in oil and an endless belt, which is gravity tensioned by the weight of the 0.25 h.p. motor mounted in a pivoted cradle. An extra charge is made for d.c. and low voltage a.c. machines.

The cabinet and round tub designs sold by Hawkins are claimed to wash the equivalent of 24 sheets per hour. The wringers are interchangeable with a roll ironer, and an extra is the "Supreme Sipho" self-emptying and filling device.

Apart from the standard Lightfoot (Westinghouse) machine, which is canister-like in appearance, a twin tub design can be supplied on three castor legs and incorporating a dehydrator for spin-drying.

The latest MacGregor & McCallum model "GS," with unconventional "Magic" vacuum-cup rotating plunger action, is of 8 lb. capacity. It is fitted with a motor switch and electrically driven pump. The type "A" de luxe wringer is cadmium plated, and has rolls of large size, while the safety trip is in the form of a horizontal bar on each side, and can be tripped by very slight movement from any direction.

The "Searsint" (Kenmore) is claimed to form a slowly whirling zone at the top and three separate rapid whirlpools below, so that the clothes circulate up and down. There are various sizes up to a capacity of 60 lb. of dry clothes per hour, some of them equipped with an automatic pump. The twin tub model, which is enclosed in a single outer casing on a tubular frame, extracts water from clothes by spinning them. Automatic change-over controls are provided for this purpose

at standing height, and a new two-way anti-gurgle pump is included for draining both washer and drier.

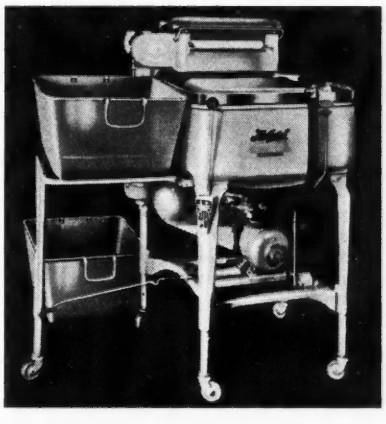
The Wilkins & Mitchell "Servis" is now made in cabinet style. The tub has an anti-splash rim and rubber-headed lid, the dual-purpose control lever for motor and agitator being mounted in a convenient position on top. The wringer control lever automatically tilts the drip tray under the rollers according to their direction of rotation. The wringer can be detached and stowed away in a cupboard at the bottom of the cabinet, which also encloses the "vee" rope drive and rubber mounted Crompton Parkinson motor.

The Madison "Whirlpool" washers are products of the "1900 Corporation" of America. A self-emptying pump is a standard accessory of the larger sizes, and a small extra charge is made for d.c. models; all have a streamlined wringer with bar-type release and safety feed hand rest.

A new streamlined circular tub design fitted with a motor-driven ironing attachment has been introduced by the Pressed Steel Co., Ltd. The "Bedal" range of British Electric Domestic Appliances, Ltd. (Thorn), includes a cabinet model, and a roll ironer can be attached to the wringer post of the machine.

The "English Electric" washer has a square body and rounded edges, without ledges or crevices where dust and moisture may collect. The "Canadian Kinsman," which is being sold by Hogan & Wardrop, Ltd., has a round corrugated tub on a four-legged under-carriage, the wringer being reversible and removable.

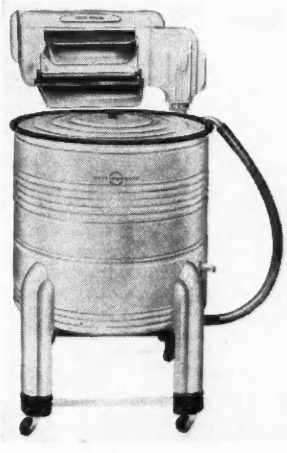
The latest Ismay "Connor" machines are described as being made of heavier metal than usual, the "Thermo" models having lids lagged with mineral wool. Nearly all the components of the wringers are cast, and the rubber rollers have "Skefco" ball bearings. Discharge pumps, when fitted, are of the belt-driven centrifugal type. The agitator has a clutch which is operated by pressing the top.



Hotpoint

Wash Boilers

Wash boilers are made in a variety of styles, though nearly all on the same principle. The tinned copper pan is invariably enclosed in sheet metal casing, galvanised or enamelled, and standing on three short cast legs. A draw-off tap and three heats controlled by two built-in switches are usually provided.



Lightfoot

The latest Jackson model is square, and so designed that it can be built in to form part of the scullery sink, the top then forming a draining board, otherwise a flat top is provided and tubular legs, an internal "Perco-Wash" sprayer being an extra. Two switches control the clamped-on elements, and a cross-bar is also clamped to the bottom for actuating the automatic safety cut-out, of a patent thermal strip type, which is suitable for a.c. only.

The larger "Dragor" boilers are square, with a table top, and can be fitted with a manual agitator and hand wringer for the dual purpose of boiling and washing clothes. More typical are the cylindrical models in the Drake & Gorham Wholesale range of from 8 to 10 gal. capacity, fitted with two shrouded foot-press switches and loaded from 2.5 to 3.3 kW. Extra alternatives include a rotary three-heat switch recessed into the boiler casing or mounted on a wall pattress, as well as an automatic cut-out of the fusible plug or thermostatic type. The patent "Manchester" circulator heater can be fitted by a flange to the pan bottom, it being self-contained and removable by hand.

Brown Brothers' boilers are known by the trade name "Duco." The Bulpitt "Swan" brand includes a square type that can be fitted with a hand agitator and manual wringer for washing purposes. For easy storage there are galvanised boilers which are bucket shaped and stand on tripod legs, of 5 and 8 gal. capacity loaded from 750 to 2,250 W.

In the C.W.S. range are both round and rectangular types. The redesigned Falk, Stadelmann selection is now available at lower prices, the 2-kW 7.5-gal. size being without switches, but the 10-gal. *de luxe* size is complete with safety cut-out.

The G.E.C. galvanised or enamelled sheet-iron types are fitted with 500-W copper sheathed strip heating elements, which are clamped to the hard copper bottom. They are adaptable to take an internal percolator, and an automatic cut-out of the fusible plug kind can be fitted.

The 6- to 10-gal. Hawkins boiler is bucket-like in shape and of welded construction with a tripod stand and drain tap. The "Supreme" immersion elements are of 2 or 3 kW, and the smallest size is not provided with a switch. A percolator can be fitted.

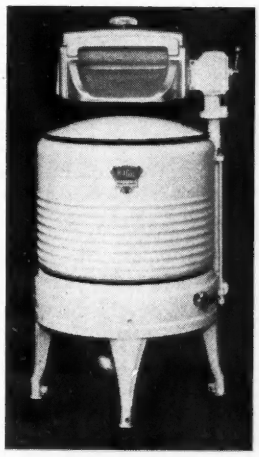
The "Uno" products of the Universal Boilers & Engineering Co., Ltd., are obtainable galvanised or enamelled in colours, in round and rectangular shapes. To the latter can be added a hand agitator and manual wringer. The six metal-sheathed elements are mica insulated and clamped on, the interior switch box being dampproof.

The Verity boiler has a patent lid which may be reversed to form a tray with handles designed to hook on the side of the galvanised body for convenient removal of boiled clothes from the copper interior. All joints are double lapped, and the mica-insulated elements are copper sheathed. The two kick-type switches, when they are fitted, are so constructed as to allow any damaged part to be replaced without much trouble.

The "Elexcel" range has been limited in number. A three-heat rotary switch is recessed into the casing and protected by a cylindrical shroud, while inside is a loose rustless wire mesh grid to prevent clothes making contact with the hot bottom. A spray circulating device can be furnished.

Drying Cabinets

For drying washed clothes and later airing them the metal cupboards made by Drying Cabinets, Ltd., have double sheet-steel walls with an insulating air space between and single or double doors. Two switches provide three-heat control (3.5 kW), and air enters at the bottom through a preheating chamber. It passes over the elements and upward through a wire mesh guard to the racks on which the clothes are hung, finally escaping through exit baffles at the top. There are no moving parts, convection alone is relied on for circulating the hot air, and the contents are shielded from direct radiation.



MacGregor & McCallum

The latest Glover cabinet is of welded mild-steel angle construction with double-cased walls and doors, which have three-way fasteners for convenience where space is limited. The ventilated saddle hanging rails are made of perforated mild steel, which is rust proofed, and are of a new kind that is claimed to improve the drying efficiency. The original "Eco-Dry" principle is retained, namely, of reheating the moist air in the exhaust duct at the top of the cabinet to prevent condensation when it is discharged.

Pressing and Ironing

Roll ironers of the H.M.V. table pattern on castors have two speeds, slow for heavy or damp clothes and a faster one for dry and light articles; the stop position can be used for extra firm pressing. Shoe lengths of 26 and 30 in. are available with or without thermostatic regulation and double open ends for such large items as sheets. The shoe pressure can be varied, and there is an emergency release lever in addition to the knee controller.

The "Apex-Vactric" roll ironer is also obtainable with thermostatic regulation, six controls and a ¼-h.p. motor mounted on rubber. A feature of this make is that the roll "floats" toward the shoe instead of the more usual movement in the reverse direction, while greater heat is provided at the left-hand end where most ironing is done.

The Beatty pedestal design has a heavy torsion spring fitted below the roll to equalise the load, thus exerting uniform pressure for thin and thick materials. The maximum pressure occurs along the lower lip of the heated shoe, to impart an extra smooth finish. The height is adjustable, and apart from the pilot lamp, motor switch, knee control and emergency lever, there are dual switches for the 625-W element in each half of the shoe.

One model marketed by Hawkins is of the drop-down pattern for conversion into a kitchen table of normal size. The motor is of 125 W and the shoe of 1,150 W, the latter having a surface of 4.75 by 26 in., and exerting an equalised ironing pressure of 100 lb.

The "Dryad" drying cabinet

Dual control for hand and knee and other customary features are possessed by the "Searsint" pedestal ironer.

Among flat irons the H.M.V. automatic is supplied for both a.c. and d.c. It has a one-piece body and handle, porcelain finished, a fixed connector, and two thumb rests for right- and left-handed use; the sole-plate is grooved to enable the user to negotiate pleats and buttons.

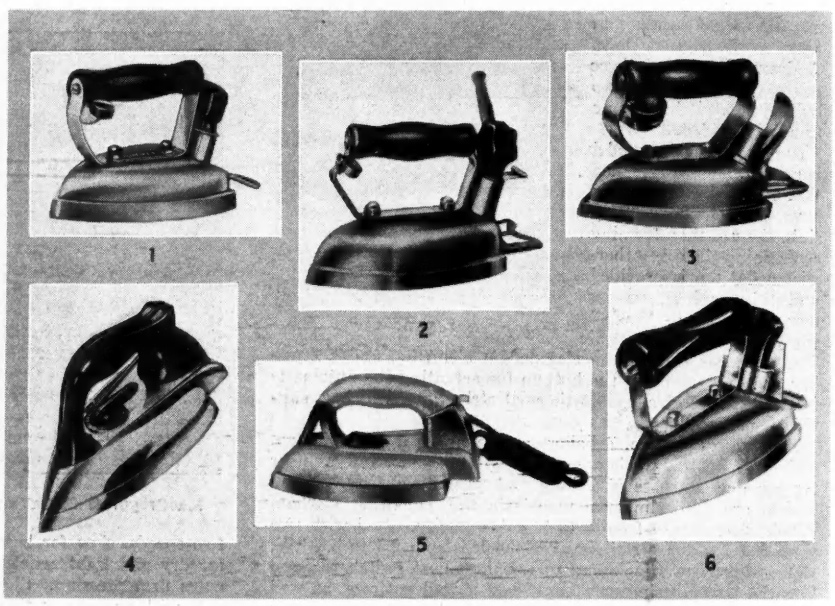
Apart from the inexpensive Toubkin iron there is the thermostatic "Golden Arrow" with a regulator knob marked in terms of materials. Both are 5 lb., 450 W, whereas the 3.75 lb. "Ironmaster" is of 1,000 W, and has two co-ordinating thermostats with a controller recessed into the shaped handle.

The Beethoven "Glydwell" has a thumb rest combined with a guard to prevent the finger touching the warm handle strap, and an earthing side-entry connector.

Coloured or plated, Brown Brothers' irons include a low-priced model for travelling; it weighs 1 lb., is suitable for universal voltage, and is supplied with an asbestos padded stand in a storage box.

One of the Bulpitt "Swan" brand is a travelling iron of 300 W and weighing 3.5 lb. with three pins for voltage adjustment; a sliding plate is provided to protect whichever pin is not in use.

In the C.W.S. range is a streamlined iron with a fixed connector, two thumb rests and a regulator knob built into the front to enable the heat to be controlled.

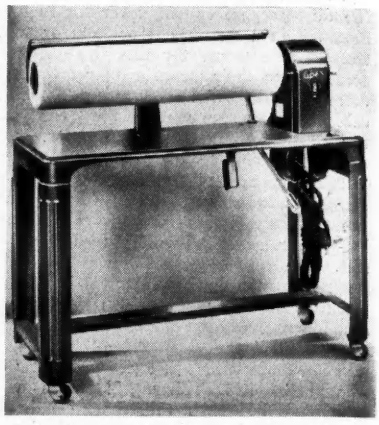


A few of the irons mentioned: 1. Sloan. 2. G.E.C. 3. A.E.G. 4. Lightfoot. 5. Falk, Stadelmann. 6. Revo "Pilot"

Among the non-automatic models sold by Electrical Commodities, Ltd., is an iron weighing not more than 2 lb. Another incorporates a "Samson" needle pointer heatmeter, and an automatic pattern is claimed to be adjustable for twenty-five different degrees of heat control. The Falk, Stadelmann range has been remodelled, the "Graybee" class being lower in price than the "Graydaye." The thermostatically controlled model in prevalent streamlined fashion is believed to be the cheapest of its class, and a d.c. type is available. A zip-fastening handbag can be supplied as an extra for the travelling iron.

The 5- to 6-lb. "Forward" irons are loaded at from 450 to 500 W, and the "Commodore" has a specially shaped bakelite handle forming a tilt-back heel rest stand, with permanent connector.

Within the last three months there have been added to the "Grafton" range a 450-W streamlined iron weighing 5.5 lb. with double thumb rests and a fixed connector, and two travelling models weighing 1.25 and 3.25 lb.



The Apex-Vactric "Model 511" electric ironer

A recent Morphy-Richards introduction has a heat selector dial with five positions. The body is made of ceramic material, with a porcelain glaze finish, and built into the bakelite handle is a visible automatic cut-out together with the fixed connector.

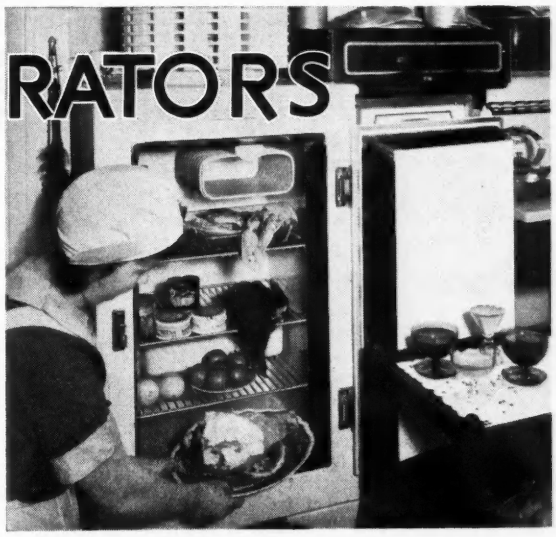
Other choices are the low-priced Revo "Pilot," the new Vidor with one-piece bakelite handle, the 1,000-W Lightfoot (Westinghouse) with a heat regulator; both plain and automatic "Sunco" and Hawkins models; Hotpoint, G.E.C., Siemens, the Hattersley "Swinton," Rowlands, Sloan "Summit," British National, and the plated or coloured Carron, A.E.G., and Moseley "Eddo," the last-mentioned range including a universal voltage model and a travelling iron.

There are also the English Electric, the Kaufmann "Phœnix," automatic Mayer-Newman and Elexcel designs.

A thermostat recently introduced by British Thermostat Co. is in skeleton form for incorporation in domestic flat irons, and consists of a bi-metal strip operating an independent switch with silver contacts suitable for 1,000 W at 110 to 250 V a.c. To enable it to respond to sole-plate temperature only the bi-metal strip should be placed in intimate contact with a machined surface recessed in the sole-plate. The temperature setting is adjusted by raising or lowering the upper spring-mounted switch contact by means of a cam with a spindle that can be made to project horizontally or vertically, so that the regulating knob may be placed at the rear of the iron or on top of its body.

The Electrical Elements Co. (proprietors: Hammond & King, Ltd.) makes heating elements, singly or in quantities, of various shapes and wattages for flat irons and other small household appliances. The universal fitting "Eeko" elements are suitable for replacements in most makes of irons. They are supplied in two qualities, insulated with ruby mica and a cheaper class with spotted mica. Both are wound with nickel-chrome ribbon, no extra charge being made for special voltages, or low loadings; beaded wire leads can be fitted instead of standard punched strip terminals.

REFRIGERATORS



Small refrigerators for incorporation in the kitchen arrangements are a recent development. New models continue to appear and "refinements" are receiving a great deal of attention.

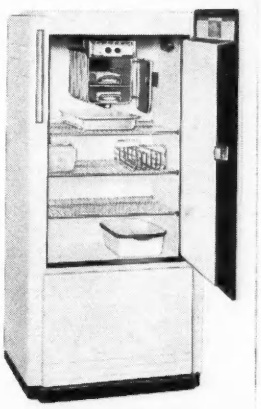
THE past year has seen little change in refrigerator design, but manufacturers have introduced a standard 2¼ cu. ft. refrigerator at about 22 gn., while one small machine is available at 15 gn. for building into flats. Compressor types are universal with the exception of the Ismay "Zeros," which works on the absorption principle with an intermittent time cycle.

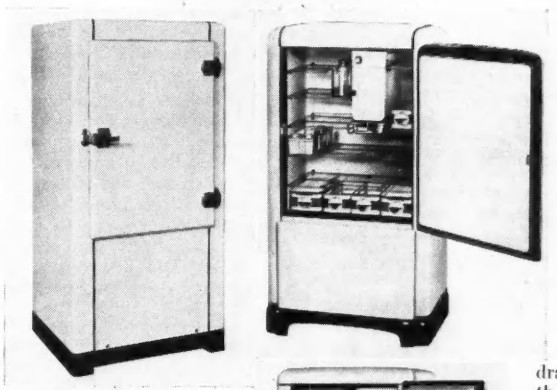
One of the most interesting newcomers is the "Multifrige" (Express Refrigerating Co., Ltd.) which has a "master evaporator" which controls the temperature in three individual compartments. The top compartment can be maintained at 30 deg. F., the lower one at 40 deg., and the side compartment at 50 deg. The net capacity is 14 cu. ft., with a shelf area of 21 cu. ft. The "PB.16" (International Refrigerator Co., Ltd.) is another newcomer in the large sizes. It has practically every possible refinement in its 16 cu. ft. cabinet, the unit being hermetically sealed with forced draught cooling. Another new B.T.H. model is the LA.34, 3 cu. ft. capacity, with an enclosed hermetically sealed unit in the base of the cabinet. Two new cabinets in synthetic finish (5.46 and 5.68, 4½ and 6½ cu. ft. respectively) have been added by Moffats, Ltd., whose equipments are now fitted with large-capacity, low-speed (350 r.p.m.) reciprocating compressors, V-belt driven capacitor motor.

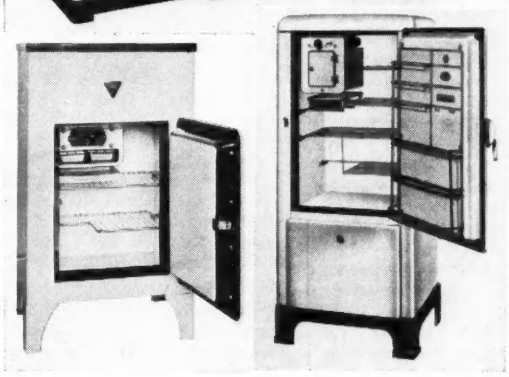
To enable the user to utilise the basket container on the door of the "Baskador" model of L. G. Hawkins & Co., Ltd., a sliding shelf pushes back. The basket is easily removable so that the contents of the refrigerator can be taken out and placed on the table without several trips to the refrigerator.

The "S.24" is a new Prestcold machine with a capacity of 2 cu. ft. and a shelf area of 4½ sq. ft. The flat porcelain lid can conveniently be used as a table. Another small one is the "Fridgette," a 1¾ cu. ft. model of the Marco Company, and the 2 cu. ft. "Percold" is a small design of the Coventry Refrigerator Co. The latter is said to be the lowest in price of any refrigerator when obtained in the special form for building into flats. Improved 4¼ and 7 cu. ft. Marco refrigerators are now available, and the "Carlton," a new introduction, has a capacity of 15 cu. ft. A smaller Frigidaire has been produced—a 2 cu. ft. model with a shelf area of just over 5 ft. The de luxe "8" and the "Imperial" 13 cu. ft. models are also new developments. Six "Westinghouse" refrigerators are available, for either a.c. or d.c. Two newcomers, known as type "H," have been introduced; these differ slightly from the standard type in the internal-shelf arrangement, and have capacities of 7¼ and 9½ cu. ft.

The 2¼ cu. ft. "S.228" of the Sparton Co. has a shelf area of 5¼ sq. ft. and an overall height of 3 ft. The same company also makes models of up to 9 cu. ft. Another small cabinet is the "Alba," a 3½ cu. ft. size, with 6½ sq. ft. of shelf area and a direct-drive compressor fitted with a "Delco-Thermotron" motor. "Crosley" refrigerators, also sold by A. J. Balcombe, are available with an "Electrosaver" hermetically sealed compressor unit, a large vegetable bin and a door shelf.







Top: Coldair "DMC.41"; centre: Century 3½ cu. ft. model and H.M.V. "P.818"; bottom: Prestcold "S.24" and Sparton "D.468."

Special types working at a very low temperature have been marketed by H.M.V. Household Appliances. They are known as the "LTP.87" and "LTP.127." In view of its limited appeal this type is produced parallel with the standard models, all of which are driven by the "Silent Circulator" compressor. The lowest price for a 4½ cu. ft. refrigerator is claimed by the Century Refrigeration Co., Ltd., which is placing on the market two larger models with capacities of 6 and 8 cu. ft., also at an unusually low price.

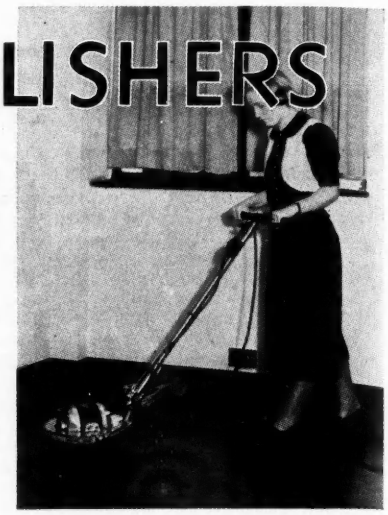
L. Sterne & Co., Ltd., are maintaining four models of 3.3, 4.3, 6.3 and 8.1 cu. ft., and prices have been reduced. Little change is in evidence in the Vactric refrigerators—the "B.410," "B.665," "B.625" and "B.800" are being continued, the respective food storage capacities being 4.1, 6.6, 6.2 and 8 cu. ft. The larger model has a twin compressor instead of a single one and semi-automatic defrosting is incorporated. Searsint, Ltd., has six "Coldspot" models with food storage capacities of from 3.4 cu. ft. up to 8.35 cu. ft.

A wide range of refrigerators is made by Kelvinator, Ltd., comprising ten models. Flat tops have been fitted to the 2½ and 3 cu. ft. refrigerators so that they can be housed under shelves and draining boards—making them particularly suitable for flats. The "S.S.U." series in this capacity has the units at the side, allowing the refrigerator cabinet to be made sufficiently low to fit under the draining board, or to be built up in the form of a combined sink or cupboard unit.

The General Electric Co., Ltd., has taken over manufacture of the "Coldair" refrigerator at its new works at Wembley, and a range of ten is available with capacities of from 3 to 20 cu. ft. Two unusual models comprise a refrigerator and sink unit and a refrigerator and cupboard unit.

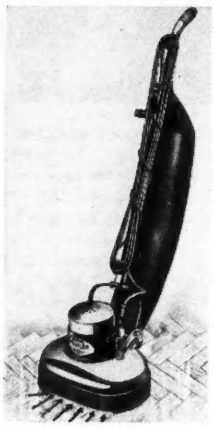
A large range of "Stewart-Warner" refrigerators is sold by the Cooper-Stewart Engineering Co. Special features of the "Chillaire" of Orme, Evans & Co. are the oil-bath compressor driven by motor by British Thomson-Houston and the castors upon which the cabinet is mounted.

CLEANERS & POLISHERS



While few changes have been made in vacuum cleaner design generally in the past year, a growing interest has been taken in floor polishers. A new development is the carpet shampooer for domestic use.

THE question of saturation point in vacuum cleaner sales has been coming increasingly to the fore during the past few years, and the diminution of sales has accelerated greatly during the past year. While the market remains steady for supplying new homes and in replacements it is nevertheless a reduced one. American experience has suggested that saturation need not be feared, but its effect in this country, coupled no doubt with a degree of trade stagnation due to the unsettled international situation has led many manufacturers to develop a plan for

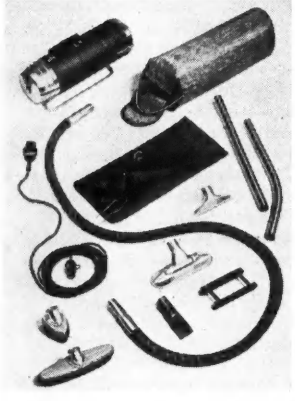


The C.C.A. "Suction-Poliflor"

the acceptance of old cleaners on a part-exchange basis and the selling of moderately priced reconditioned cleaners.

This situation, and the fact that parquet floors are now often to be found in quite moderately priced houses has led to a growing interest in floor polishers, while a still more interesting development, at least for large houses and mansions, is the carpet shampooer (as supplied by Dixon and "Silent Chief"), which enables the user, with the aid of a vacuum cleaner, thoroughly to clean a large carpet *in situ*. The shampoo has spirit base and therefore the carpet does not remain wet for long.

Little general change is to be seen in vacuum cleaner design during the past year and remarkably few new models have made their appearance. In the lower-price range the cylindrical type of cleaner is almost universal as it lends itself to mass production, but the external bag proves more popular with those who can afford more than about £7, while in a class by itself, the vertical canister type is still represented solely by the B.T.H.-Welbeck, "Norfolk" (British Electric Equipment Co., Ltd.), and the Tellus. The first of these has a square canister to facilitate dust deposition,



Eureka cylinder model

while the others are circular.

Personal taste, however, is the main deciding factor. While the cylindrical type has first to be assembled, the external bag is available for immediate operation and, furthermore, it is impossible to have a motor-driven brush in the cylinder type—frequently an important selling point. Offsetting this, however, is the possibility of a certain amount of dust percolating through the fabric of the bag into the room, particularly if it hits anything.

Among the cleaners introduced during the year, there is a new Hoover, the largest of the range, to which a new high-speed motor has been fitted. A slightly faster beater speed is provided, but the outstanding feature is the connecting equipment for tools, which can now be slipped into place while the motor is running, and without turning the machine upside down and removing the belt, as was previously the case. The motor housing is now of bakelite and a special rack carries the exceptionally light duralumin tools. The weight is 17 lb. 4 oz. A "Junior" model and a hand model complete the range.

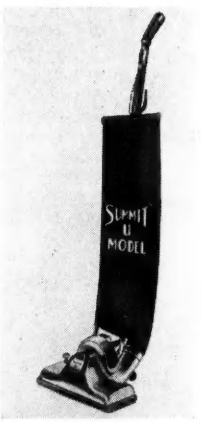
The latest developments by Vactric are the "Senior" and the "W.100." The former, an external bag machine, embodies a vertically mounted motor, a belt-driven brush and a headlight. A new method of motor suspension makes the "W.100" unusually quiet in operation, and the dirt-holding capacity of the bag has been increased. Considerable improvements in the motor design and assembly have been made in the small hand model.

A motor-driven revolving brush is fitted to the recently improved cleaner of the Northern Steel & Hardware Co. The dust bag is of unusual shape and has six hinges to facilitate opening. The rear castor swivels and the nozzle is adjustable for the thickness of the carpet. These remarks also apply to the "Sector" cleaner of Electrical Components, Ltd. Another newcomer is a hand polisher marketed by L. G. Hawkins & Co. This is basically similar to the hand-type vacuum cleaner, but it has a revolving brush over which can be fitted a special felt pad for polishing and for use on paints and soft woods.

Hitherto the only Eureka cleaner has been an upright model without a sweeper brush, but this year has been added a new lower-priced cylinder model, the "V.3," fully equipped, with all accessories. The "Vampire" of the A.E.G. Co. has been redesigned with an all-insulated, hard paper composition casing, with moulded ends, and a double-bladed fan. The range of high-quality C.C.A. cleaners is being maintained and comprises two external bag models, one with a beater and one without, and also a *de luxe* cylindrical style.

A new twin-vibro motor-driven brush is used in the "Sparto-Vac" (Electrical Commodities) upright cleaner. It has a ¼-h.p. motor running at 10,000 r.p.m., the average speed of the brush being 2,000 r.p.m. A water lift of 18 in. is claimed, and a series of interchangeable tools is provided. No revolving brush is employed in the Beatty cleaner. The motor drives two separate fans. One draws air through the armature and serves to cool the motor which revolves at 11,500 r.p.m.

The British Vacuum Cleaner & Engineering Co., which has long been known for its "Goblin" vacuum cleaners, has an unusually wide range available. The smallest is the "Clean Sweep" cylinder model, and the largest the relatively new "Monarch" external bag model. Others comprise moderately priced cylindrical and outside bag machines, and a luxury cylindrical machine. A spraying attachment is



Sloan "Summit" cleaner

available for all models. A number of improvements in design have recently been made in the Hotpoint "Junior" model cleaner. The diameter of the brush spindle has been increased and the arrangement of the bristle tufts altered to ensure greater efficiency and eliminate any tendency of cotton to wind round the brush. Brown Bros. have an external bag "Duco" model with a motor-driven brush available and a dual-purpose hand cleaner with an extension handle.

Probably the only cylindrical cleaner to be fitted with a revolving brush is the "New Welbeck," which has a retractable brush operated by pressing the nozzle hard against the floor and moving it along. This company also has a special waxer. The G.E.C. markets three types of vacuum cleaner. Two of these are of the external bag type, and the third is a small hand machine of unusual design, and known as the

Other Useful Devices

INCREASING interest is being taken in equipment for cleaning and purifying air. True air conditioning, however, comprises ventilation, filtration, circulation, cooling and de-humidification in summer and heating and humidifying in winter. A unit of this type, specially designed for domestic use, has been introduced by Carrier Weathermakers, Ltd., its cooling capacity being 8,030 B.th.u. per hour; the heater loading has been increased to 2½ kW. The heating is thermostatically controlled while the vaporising immersion heater is hygrostatically controlled.

Heating and humidification are carried out also by the "Zephaire," a small cabinet-type heater fitted with a 1-kW heater fan and 32 oz. humidifier and resembling in appearance a radio set. It is sold by Prior Burners, Ltd., and Air Conditioning and Engineering, Ltd. Filtered and heated air is also provided by the new Belling model, which is also available with a humidifying arrangement. A humidifier which is incorporated in a pendant lamp bowl or a floor standard developed by Harold Ashton, combines utility with decoration. It is particularly suitable for getting rid of smoke. Ozonisation is the process employed by Ozonair, Ltd., for its air purifier. The domestic model is portable and suitable for rooms of up to 3,000 cu. ft., a fan being fitted above the actual ozoniser, which only measures 6 in. square. The loading is 5 W without fan and 20 W with fan.

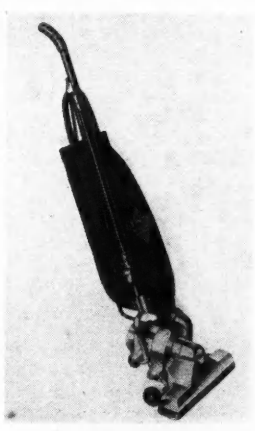
Linked with air conditioning and purification are ordinary fans, of which a wide range is available. The Hotpoint ventilating fan is designed especially for quiet running by means of specially shaped blades. The air delivery is sufficient to renew the air in the average-sized kitchen in three to five minutes. The Limit fans are available in several forms, with universal or a.c. induction motors. Rubber blades are incorporated in the "Safe-flex" fans of Electrical Commodities and fabric blades in the "Nastrovent" (Marelli & Co., Ltd.) fans. Marelli & Co. also have a "Duo" revolving table fan comprising a single pedestal and motor with a set of blades fitted at each end of the motor; the range is completed with table, ceiling, bracket and exhaust fans in oscillating and stationary forms. All types of fans—oscillating and fixed ceiling, desk and bracket, and exhaust—are manufactured by Veritys, Ltd. Among the many Revo fans the "Elite" is unusual in having a wire mesh gauge. For kitchen ventilation in particular the Vent-Axia 6- or 9-in. model is particularly suitable as it can be fitted easily in a window, although it is also available as a wall fan. It is, of course, of the extractor type. The 9-in. size has two speeds. Fans with unusual guard designs are made by Crompton Parkinson, Ltd., and Graham Farish, while the Ormond has a moulded pedestal frame.

Electrical bathroom requisites play an important part in the modern home. Hairdryers are, perhaps, the most popular, although these should not be used actually in the bathroom for safety. There are two A.E.G. models and A. C. Gilbert have an attractively designed style in ivory enamel with a shockproof casing. A cheaper design provides hot air only. Forward Electric design employs a rotary switch for operation, while a feature of the "Efesca" (Falk, Stadelmann) is the mirror in the side. Calvete models are made in the ordinary blower style or with an extra large aperture 4 in. in diameter. Bakelite is used by Bulpitt, Sloan, Ormond and Bylock, a feature of the Bylock being the intake at the back to prevent hair being drawn into the fan. A *de-luxe* hairdryer on a stand, adjustable for angle and height and with an easily adjustable mirror is the General Inductance Co.'s "Gilda." The heater has three different temperatures.

Cleaners and Polishers (*Continued from preceding page*)

"Little Wonder." It weighs only 3 lb., but has, in addition to the usual suction nozzle, a small revolving brush.

Machines of a cylindrical type, both low-priced and in *de luxe* form are being made by Bylock. The smaller models have a ⅛-h.p. motor running at 12,000 r.p.m., while the larger machines have ¼-h.p. motors giving a water suction column of approximately 45 in. and an air displacement of 80 cu. ft.



G.E.C. cleaner

per min., three fans being coupled to the motor in series.

The "Cadillac," which is being sold by J. Toubkin, is available as a full-sized upright external bag machine fitted with a headlight and a motor-driven brush, and as a hand-type cleaner, also fitted with a headlight. Both a cylindrical type, complete with attachments in an attractive box, and also an external bag machine with a motor-driven brush are available from the Sloan Electrical Co. under the trade name "Summit," while the "Supreme Beat-a-Brush" upright cleaner with a revolving brush has a spraying attachment included among its accessories. The Hawkins "Ferret" cleaner can be converted easily for use as a floor model by means of extension pieces.

The "Ediswan" external bag cleaner is to be redesigned, the nozzle thickness being increased to include a floating brush specially mounted to increase the suction. A toggle switch will be incorporated in the handle, and an enlarged dustbag with a special spring mouth will be fitted. The "Efesca" cleaner is being maintained in both forms, as an upright model with a rotary brush and as a cylinder type, both being supplied with a full complement of accessories. The East London Rubber Co. has now, in addition to the "Standard" cleaner, a *de luxe* model known as the "Super," both machines being of the cylindrical type. A hand machine is also sold by A. C. Gilbert.

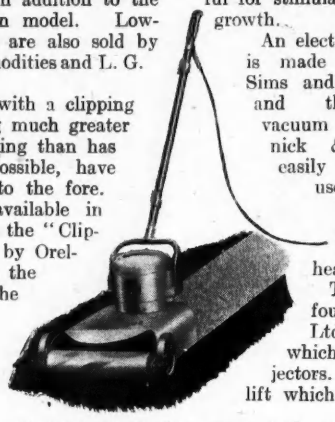
As already mentioned, the slump in vacuum cleaner sales has brought about added interest in polishers. Specialists in quality machines of this type are C.C.A., who have models ranging from a small domestic machine with a single horizontal revolving brush, the "New Poliflor" with a roller-type brush, and the "Giant Poliflor," a large machine with dual roller-type brushes. A "Suction Poliflor" is also available, comprising a machine with two horizontal revolving brushes in addition to suction. The "Vactric" floor polisher has three revolving disc-type brushes, revolving at 950 r.p.m., while the "Purley" polisher of the Goodliffe Electric Co. has two brushes which turn at 500 r.p.m. The "Efesca" (Falk, Stadelmann) has three brushes housed in a triangular casing. The Hawkins "Supreme" polisher is available in two forms as a hand-type machine and as a floor polisher with full-length handle, a single horizontal revolving brush being employed in each case. There is also a "Duco" model (Brown Bros.) fitted with cylindrical brushes. The Rollnick & Gordon "Columbus" is specially designed for use as a suction floor polisher, vacuum cleaner or lawn mower.

M

Two-heat control is provided on the Calvete electric curling iron heater, while the "Efesca" is loaded at 150 W as are both of the Forward Electric Co.'s curling tong heaters. The "Eddo" curling iron (20 W) is a product of H. G. Moseley, while the S.L.R. "Radiant" hair curler, English made and loaded at 20 W, has been introduced as an addition to the S.L.R. Canadian model. Low-wattage curlers are also sold by Electrical Commodities and L. G. Hawkins & Co.

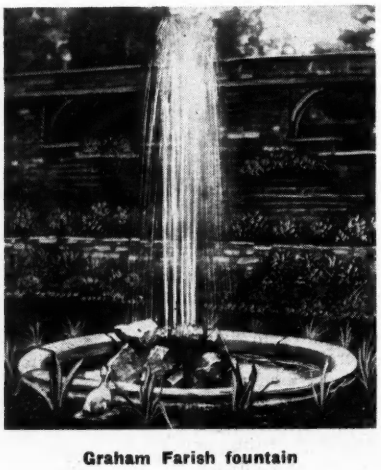
Sloan "Summit" hair-dryer

Dry shavers with a clipping action, affording much greater comfort in shaving than has hitherto been possible, have recently come to the fore. Among those available in this country are the "Clip-shave" (made by Orel-Micro Electric), the Schick and the Remington. Towel dryers and clothes airers can usually be obtained for wall mounting, although pedestal forms are to be had. Typical examples are the Arora (250 W, pedestal), the Vidor (200 W), the Hedin, the Benham (pedestal type, 200, 225, 350 and 400 W), the "Efesca" (150 W), and "Unity." Other useful accessories are illuminated shaving mirrors, electrically heated shaving mugs and illuminated bathroom mirrors with incorporated or separate lamps.



Rollnick & Gordon vacuum cleaner and polisher adapted for grasscutting

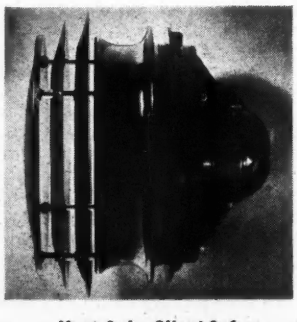
In the kitchen many useful accessories can be employed, such as the Hawkins mixer-beater, Gilbert "Kitchenetta" and Toubkin mixer, which enable all kinds of mixing and beating operations to be done electrically. For the G.E.C. automatic drink mixer a totally enclosed motor is used. Automatic tea-making machines which also switch on a light at a predetermined time are the "Teesmade" (British Vacuum Cleaner Co.) and "Tecal" (L. G. Hawkins). The latter company also has an electric ice-cream freezer. A water-jacketed glue pot is made by the A.E.G. Co. Electric washing-up machines are becoming popular in large houses and Electrical Aids (Dreadnought), Ltd., which introduced one of the very first small machines, is shortly to place on the market a redesigned model. A point of interest about the Hotpoint dish washer is that the dishes are virtually sterilised as they are washed in water at a temperature of 160 deg. F. The Kent Dishwashing Co., Ltd., has a dish-washer suitable for domestic use, and Newmectric, Ltd., have lately introduced a combined electric sink and washing-up unit. Spare elements for irons, kettles, and hotplates can be obtained from the Electric Element Co., and Mica Elements, Ltd. Wire guards for elements are made by H. W. Carter & James, Ltd.



Graham Farish fountain

An illuminated electric bell push is made by V. & E. Friedland, who also have a transformer operated low-voltage night-light. Among electric bells are those made by Ward & Goldstone, V. & E. Friedland and Siemens-Schuckert, Ltd., the latter operating directly on 220-V mains.

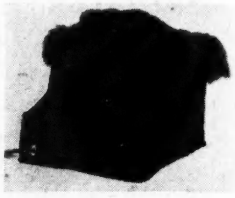
For the garage there is the Westinghouse "Westric" home battery charger. An electric soldering iron as a useful workshop accessory. A new model has recently been introduced by the Rawlplug Co., Ltd., and the "Solon" is being maintained by W. T. Henley's Telegraph Works Co. Electric car radiator heaters are supplied by Desmo, Ltd., Unity Heating, the Arora Co., G. Bray & Co., the Forward Electric Co., and E. H. Hill—the last, owing to its special design, lends itself to general use where a little heat is required. Sewing machine motors for attachment to ordinary machines are made by G.E.C., and the Singer Sewing Machine Co. makes an all-electric machine.



Vent-Axia Silent-9 fan

Those who play billiards will appreciate the special billiard table iron of the Dowsing Co. A well-kept crease can be maintained by the Driver hand trousers presser. In the garden the G.E.C. garden frame plant irradiator is useful for stimulating early plant growth.

An electric lawn mower is made by Ransomes, Sims and Jefferies, Ltd., and the Columbus vacuum cleaner (Rollnick & Gordon) is easily convertible for use as a lawn mower by substituting other attachments. An electric greenhouse heater is an interesting product of Bertram Thomas, who also make a special heater for car engines.



Thermega foot muff

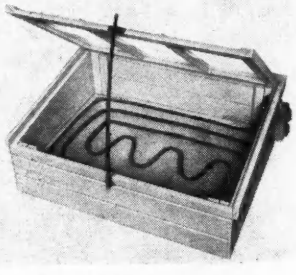
The keen gardener will appreciate the electric fountain which is being made by Graham Farish, Ltd.; this would lend itself to floodlighting for which the same company supplies low-priced projectors. Marryat & Scott, Ltd., have a special service lift which is suitable for private houses as it can frequently be built into the actual furniture of the house, or a special cabinet may be provided to harmonise with the existing furniture. Special safety devices are incorporated in the equipment.

The "Takalite" cigar lighter is made by Smith's English Clocks. The cigar is simply pressed down and when the element glows it can be removed. Glass-sided indoor aquarium tanks are supplied by Berkeley & Young, Ltd., with a thermostatically-controlled heating element and overhead lighting.

Solid type boiling plates demand the use of special flat-bottomed utensils if the maximum efficiency is to be secured. These are obtainable from such manufacturers as Ernest Stevens ("Judge" ware), Corfield-Sigg ("Crown Merton"), Bulpitt ("Swan") and Buncher & Haseler.

It is in the matter of appearance that improvements to toasters are mainly centred. Streamlining and removal of all ledges are becoming common practice, good examples being seen in the Electrical Commodities "Samson," the Toubkin "Empire Aristocrat" and the Gilbert "Toastmaster." Slight decoration in the form of geometrical and floral designs have added touches of distinction to the products of Revo, Ormond, Moseley and Mayer, Newman & Co.

In nearly every case the bread is automatically turned by lowering the sides, and in some of the more expensive apparatus, the "Toastmaster" for instance, the electricity is switched off automatically when the toast is cooked to the desired degree. A bell rings on the Mayer, Newman automatic model when the toast is done. For the competitive market Falk, Stadelmann have brought out the "Standard" model fitted with a radiant element of the same type as that used in the "De Luxe." Henley's continue to market their waffle iron.



G.E.C. garden frame

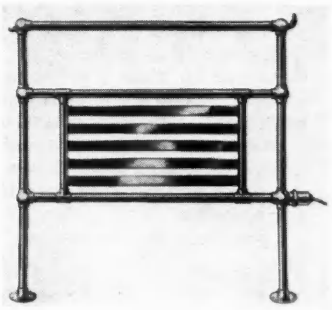
Still quicker boiling, improved safety devices, and facilities for boiling small quantities of water are the principal objects in recent improvements in kettle design. Higher loadings for "Swan" models are announced by Bulpitt and it is possible to have a new 3-pint G.E.C. kettle with a sheathed wire type element loaded at no less than 2 kW, permitting 1 pint to be boiled in 2 mins., 2 pints in 4 mins., and 3 pints in 5¼ mins. This kettle has a safety device operated by the ejection of the connector, which can be puhed in again immediately the kettle cools down.

Another type of safety device, which is employed in the latest Premier kettles, is thermostatic in principle and completely automatic, a bimetallic strip breaking the contact when a predetermined temperature is reached and restoring

it as soon as the immersion type elements have cooled down. An automatic, resettable cut-out safeguards the new 3-pint "Creda" kettle, a special feature of which is the position of the embedded type elements very close to the bottom to enable very small quantities of water to be boiled. As no feet are fitted the model can be used as an ordinary kettle or for very fast boiling on the hotplate. Loaded at 975 W, its boiling times are given as 1 pint, 2¼ mins.; 2 pints, 4½ mins.; 3 pints, 7¼ mins. The ability to boil 3 pints of water within 5 mins. is claimed for the London Aluminium Co.'s "Diamond 550" apparatus.

Other new kettles, each with its own advantages, are announced by Elcap, the Grafton Heater Co., and Hotpoint (a 5-pint model). The kettles marketed jointly by Falk-Stadelmann and Corfield-Sigg under the respective trade names of "Efesca Surves" and "Crown Merton No. 511" are now available in copper and chromium plate on copper. Copper models are also now obtainable from Best Products, whose new safety device incorporates a stainless steel ejector plunger, which is said to overcome all the inherent faults of this type of device. Audible warning is still a feature of this company's "Monica" model.

Little need be said about coffee percolators except to draw attention to a general improvement in design and appearance, noticeable particularly in the products, for example, of the London Aluminium Co., Bulpitt, H. G. Moseley, A. C. Gilbert, the Forward Electric Co., Toubkin and Magrini. An electrically heated version of the well-known "Cona" percolator is obtainable from Falk, Stadelmann. Plenty of electric saucepans, frying pans, fish kettles, etc., are available, and Brown Bros. have an attractive polished aluminium, pewter finished "Duco" heating jug for water or milk.



Benham towel airer

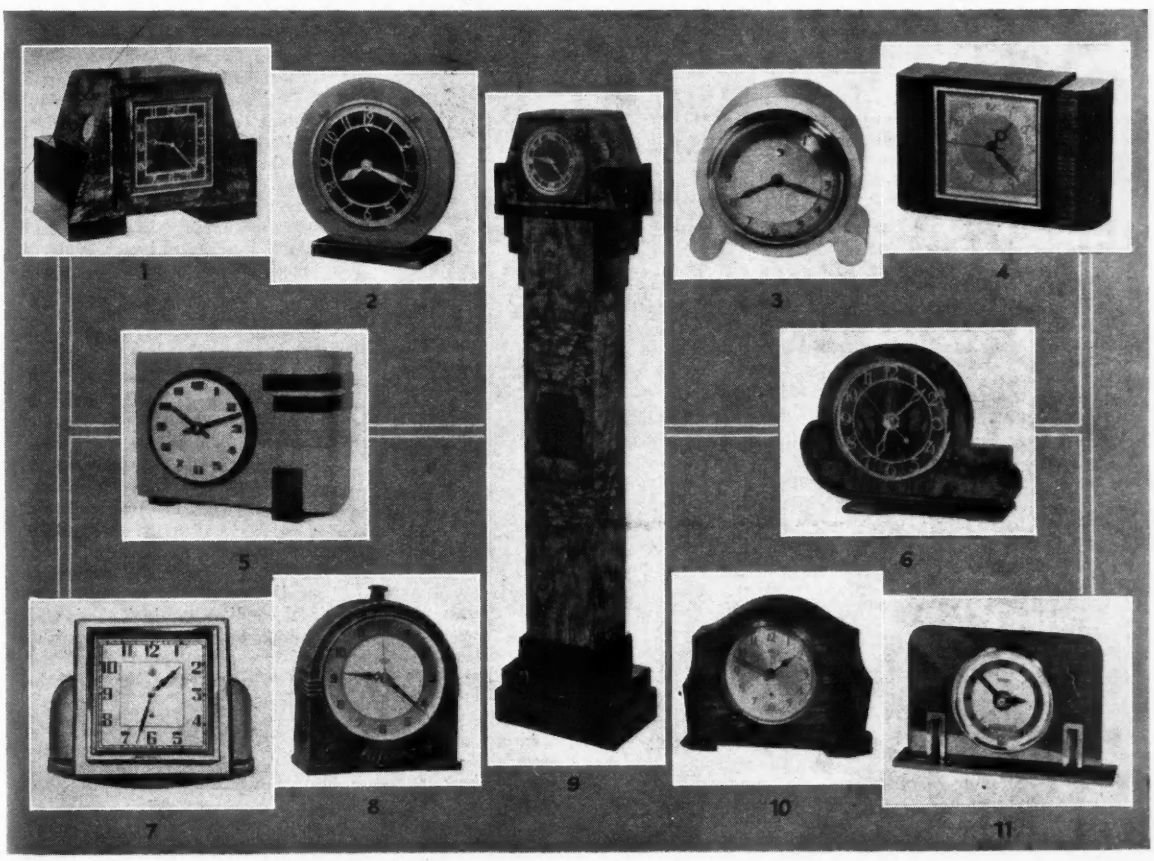
Electric Timekeeping

ONE of the first a.c. mains driven timekeepers introduced into this country was the Everett, Edgcumbe "Synclock." There is a very varied selection of Ferranti ordinary and alarm models, while Smiths cater for all requirements, including chiming. The smaller G.E.C. patterns have all-insulated drums.

The "Orel-Micro" operate for over ten months from a single 4.5-V flash-lamp battery, the Swiss-made movement weighing only 2 oz. Bulle have over thirty models, while British Tempovox make mantel and grandmother style cabinets combining radio receivers.

The extensive "Goblin" range is guaranteed for two years by the British Vacuum Cleaner & Engineering Co., and include a bedside clock with a lamp. Two of the T.M.C.-Harwell products are housed in coloured cases made of "Catalin" cast phenolic resin. Those of Hammond make distributed by Electrical Commodities include one with an automatic calendar and an alarm.

Gent & Co. offer special designs for mounting on or in wood panelling, and among Graham Farish clocks is one arranged for building into tiled surrounds. The London Electric Clock Co.'s 1.5-W rotor operates at only 120 r.p.m. and can be supplied for non-standard voltages. The National Clock Manufacturing Co. features coloured mirror designs. In the Siemens-Schuckert range there are a 24-hour alarm clock with a floodlighted dial and also a model driven by a spring that is wound by a motor, so providing six hours' reserve in case of electricity failure. Among other suppliers are the Synchronome Co., L. G. Hawkins, "Sunco," Toubkin and Falk, Stadelmann, while the Lowne Electric Clock & Appliances Co. is concentrating on movements and special apparatus to meet other manufacturers' requirements.



Typical examples of electric clocks on the market

1 and 9. British Tempovox. 2 and 3. T.M.C.-Harwell (Sales). 4. Siemens-Schuckert. 5. Gent & Co. 6 and 11. Electrical Commodities ("Hammond"). 7. National Clock Mfg. Co. ("Neatlite"). 8. Smith's English Clock ("Sectric"). 10. British Vacuum Cleaner Co. ("Goblin")

WIRING & ACCESSORIES

Changes in this field have as their main objects easier wiring and greater safety. In socket outlets, for instance, screening protection has received special attention, and in the switched type there have been modifications to facilitate installation. Improved appearance has also been aimed at, particularly in cooker control units.

IN connection with the heavier type of fuse gear there is a definite trend towards the use of the high-rupturing cartridge fuse. J. A. Crabtree & Co., Ltd., are offering the "HRC" cartridge fuse as a component in their 500-V range of weatherproof switch-fuses and fuseboards. The fusible element is embedded in an inert filler and contained in a strong ceramic cylinder. The cartridges are housed in carriers and cases constituting very compact fuse units. The h.p. self-aligning contacts and the cable terminals with ample accommodation for looping are special features.

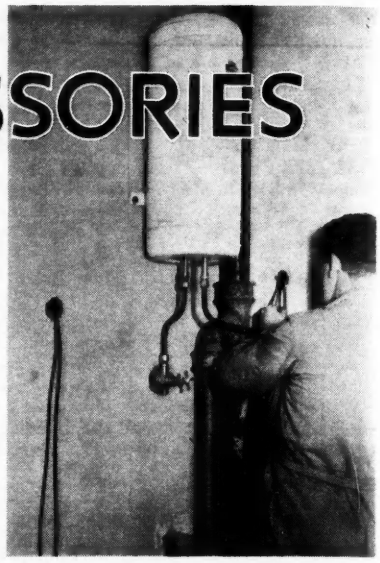
"Lancastrian" iron-clad switch-fuses by Dorman & Smith, Ltd., are available with either re-wireable or cartridge fuses. The latter are tested to 25,000 kVA and may be used on a.c. or d.c. at up to 650 V. The main spring of the q.m. and b. mechanism is in compression only during the operation of the switch and as a safeguard a secondary spring provides independent q.b. action. The bakelite triple- and four-pole service fuse boxes of Siemens Electric Lamps & Supplies, Ltd., are rated at 5 A to 80 A with cartridge fuses and 5 A to 60 A with wire fuses at 250/440 V. The fuses can be "bussed" together if required. A disconnecting link or a terminal block can be provided in the neutral way. Phase colours are indicated on the cable chamber and only one seal is required.

"Super-Sandaspeed" fuseboards of Wm. Sanders & Co. (Wednesbury), Ltd., are equipped with the "Sandaspeed Duplex" fuse with alternative types of carrier—one for the cartridge-type of fuse and one for a rewireable semi-enclosed type with the highest possible rupturing capacity as such. Laminated bus-bars are a special feature of the fuseboards, whose cases are fabricated from sheet-steel, giving rigidity and adequate strength without unduly heavy metal. Separate end plates are provided for each outgoing circuit and the incoming supply cable, with ample room for the duplication of the latter. The "Sandamax" switch-fuses are also fitted with "Sandaspeed Duplex" fuses.

Bill Switchgear, Ltd., are introducing a new all-insulated 30-A switch-fuse which is designed to compete with the cheaper class of switchgear on the market. The present all-insulated 30-A switch-fuse is of a superior pattern and is designed as a combined switch and fuse and fuse splitter. The neat walnut-finished bakelite case renders the unit suitable for installing in any room or hall-way. The G.E.C. has broken from the "black-enamel" tradition by introducing a number of its lines with a finish to match "Silverlac" conduit. This finish is less obtrusive as it merges better in the environment.

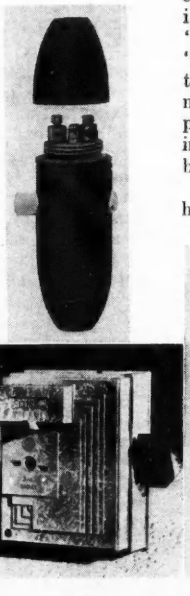
T.M.C.-Harwell square-head lampholder

A new development in principle is the incorporation of a three-pin plug and socket in a miniature circuit-breaker as in the product of A.E.W., Ltd. The protection of portable or other apparatus commonly connected by the way of plug coupling and flexible leads is aimed at. Overload and short-circuit protection is afforded by the electro-magnet tripping device. A small circuit-breaker by Combi Electric Co., Ltd., has a thermal trip. The mechanism can be held against overloads and set for faults.



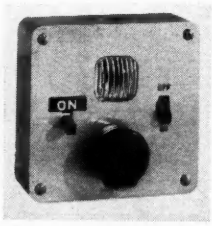
Midland Electric Manufacturing Co., Ltd., says that the growing popularity of tough rubber cables has led to the development of a full range of all-insulated switch and fuse gear which provides full protection to the user without earthing. This includes the "Memroy," "Mem 8" and "Memdix" combined switch and fuses and the "Meminx" splitter, the latter consisting of a 15-A d.p. main switch with a 2-wire d.p. 15-A fuseboard. A much improved 10-A iron-clad switch, the "Memten," has been reintroduced, together with a new "Memway" teak cased fuseboard rated at 10 A and available in all sizes from 2 to 8 ways.

"Warwick" fuseboards by Wm. McGeoch & Co., Ltd., have fuse units with specially designed contacts which afford permanent contact area.



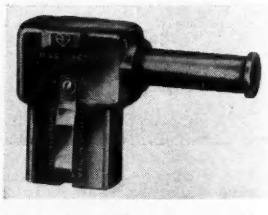
Top: Lacrinoid "Torpedo" switch. Left: "Wylex" cooker control unit. Right: Kupfer all-insulated solid-plunger lampholder.

There is now a wide range of wiring systems suitable for domestic work to choose from and the following four systems selected from the productions of British Insulated Cables, Ltd., are broadly representative of the main types. The "paper twin wiring system" comprises p.i. and l.c. conductors with hand-made and soldered joints, and provides a perfectly water-tight system similar to standard underground mains distribution. The "rubber twin wiring system" uses rubber insulated and lead-alloy sheathed conductors and by the use of special fittings this system can also be made waterproof. The tough rubber sheathed wiring system employs flexible cables which are easy to handle and practically non-kinkable. The joint boxes are moulded from high-grade bakelite. In the rubber twin wiring system with earth continuity conductor the process of bonding the metallic sheaths of the cables is effected by means of a tinned copper bonding wire under the metal alloy sheath of the cable. Special terminals are provided in the joint boxes for connecting the bonding wires of the incoming cables, and bonding clamps are dispensed with.



Arrow cooker control unit

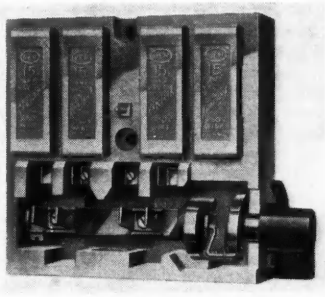
A development by Callender's Cable & Construction Co., Ltd., has been an amendment in the design of their "C.B." junction boxes and bonding accessories to incorporate a dual bonding terminal. This allows lead-alloy sheathed cables, with or without earth continuity conductors, to be used with the one range of standard junction boxes. This extra facility of dual bonding was offered in particular for conditions where a wiring installation had to provide the utmost safety. Another new feature is the protected earthing lead, specially designed to comply with the I.E.E. Wiring Regulation No. 1007 (A). Protected against both corrosion and mechanical injury, this earthing lead has a conductor consisting of



Ward & Goldstone reversible connector

tinned copper wires covered with a strong closely woven cotton braid thoroughly impregnated with special preservative.

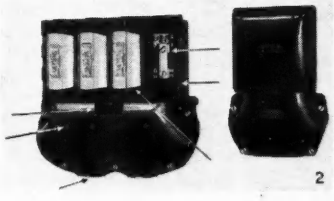
The same company has also introduced an improved form of bonding device for the lead sheaths of cables. It is a tinned perforated copper strip which possesses a resistance hardly greater than the uncut lead sheath of the cable to which it is fitted. This strip is passed round the cable sheath, tightened thereto by means of a screw and attached at one end to the joint casting box. Any diameter of cable can be securely gripped. Among the various cables specially suitable for use with domestic appliances is the heavy-duty "Goltone" cab-tyre of Ward & Goldstone, Ltd. It is non-kinking, corrosion resisting, waterproof, flexible and durable, and it will withstand rough usage.



Open view of "Meminx" splitter

Attractive cellulose enamel to harmonise with white kitchen tiling is the new finish in which Tucker's a.c. shallow cooker control unit is now available. Minimum projection, short slow-break main and sub-circuit switches, shuttered socket outlets and combined pilot and semaphore indicating arrangements are special features of this unit. A new cooker control unit by Arrow Electric Switches, Ltd., is believed to be the first to have all the component parts mounted on and made an integral part of the porcelain base. The mains switch, sub-circuit switch, socket and pilot light lampholder are joined together by means of heavy brass shunts which are sunk in the base. The case is of pressed steel and the unit is easily removed from the case by loosening three screws. New style "tight grip" terminals on the mains switch allow for easy wiring and ample room for looping out. The unit is only 2¾ in. deep and is easily adapted for flush mounting with an over-lapping plate.

The all-insulated "Wylex" cooker unit of George H. Scholes & Co., Ltd., is small and neat, and the moulding is impregnated with fibrous cotton to give strength and resiliency. The switch has silver contacts and a slow and short break. When it is in the "on" position the contacts are pressed into connection by very strong springs. In the fuse cover are the sizes of fuse wire to be used, which comply with B.S.S. 88-250 a.c. fusing factor. A cartridge fuse to be introduced soon will be interchangeable with the existing contacts. There are no pilot lamp nor mechanical indicators, except for "on" and "off" on the handle.



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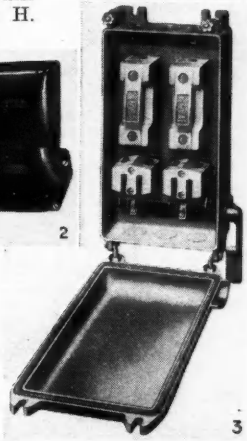
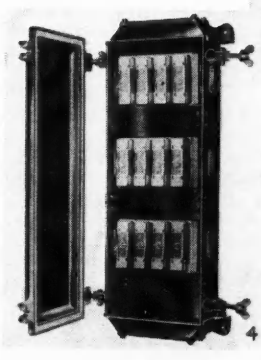


3

The new Crabtree cooker control unit is essentially modernistic and has a "one-piece body" appearance. Both forms of indication are incorporated as standard. Adequate knock-outs render it suitable for use with any kind of wiring system. The main switch has a "roller" action. The moving contacts are situated on diametrically opposite sides of a cylindrical body which, when the handle is operated, revolves about its axis. Both the "make" and "break" are practically instantaneous and serious arcing is claimed to be rendered impossible. The fuse unit embodies one or two specially designed high-efficiency rewirable cartridge fuses.



4

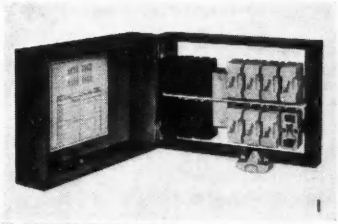
A change-over unit has been introduced by A. Reyrolle & Co., Ltd., to enable a supply to be given as desired either to a water heater or to a cooker or other appliance.

The British Thermostat Co.'s "RT" room thermostat is the kind of instrument which will harmonise with modern schemes of decoration. In the new Rheostatic "Q" thermostats arrangement is made not only to switch the heaters on or off according to whether the temperature is below or above the set point, but also to adjust continuously the intensity of both convected heat and radiation.

Rotary snap switches represent considerable development, particularly in the cooker field, and the following observations are made from the catalogue of Tok Switches, Ltd., Type 112 10-A s.p. non-reciprocating switch, with a base diameter the same as that of the 5-A unit (2$\frac{9}{16}$ in.) is arranged with quadruple instead of double break. Although it has not the same overload margins of carrying and breaking capacities it is produced for jobs where space is of material importance. An iron-clad non-reciprocating switch is available in 5-A, 10-A and 20-A s.p. models and 5- to 10-A, 20-A and 30-A d.p. models. A 5-A s.p. unit measures 3¼ in. square and 2¼ in. deep.

A new Tucker wash-boiler cut-out switch is a d.p. 15-A switch mechanism designed for mounting in circuit with wash-boiler elements to interrupt the supply immediately the boiler becomes dry. The increased temperature actuates the mechanism. A new 7-A s.p. heater switch by the same company with an all-metal frame and mica insulation is similar in design and construction to the 15-A type.

There are many interesting developments in switches for incorporation in appliances. The alternate-push switch by A. P. Lundberg & Sons, Ltd., is a 2-A unit with a q.m. and b. movement. It is a panel switch for flush mounting and is available in the following types: single-way, two-way, intermediate, d.p., d.p. change-over and series-parallel. The bevelled mahogany-finished bakelite front measures 2½ in. by 1¾ in. by ⅛ in. The micro-switch of Burgess Products Co., Ltd., is operated by means of a centrally situated press-button and the switch action cannot be damaged by overload or overtravel of the press-button. Nor can the switch snap over as the result

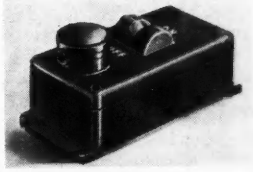


1

1. Warwick 5-15-A teak fuseboard. 2. Siemens bakelite service fuse-box. 3. "Sandamax" combined switch and fuses. 4. Crabtree distribution board with cartridge fuses

of vibration or shock. With silver contacts, the switch can be used on a.c. circuits up to 3 kW. The dimensions are 3 15/16 in. by 1⅞ in. by 2 1/16 in. A range of on-off and change-over switches by Castelco (Great Britain), Ltd., is available with holders for fixing on tubes up to 1-in. diameter. An interesting Arrow switch can be supplied as a momentary-contact unit for use on refrigerators. It is also supplied as a double-action switch operating by one push for "on" and one for "off." It is available in models varying in the numbers of poles and ways and is rated at 3 A. A "Goltone" 2-A bakelite all-insulated midget push switch is designed for mounting on the bases of table lamps. The reversible iron connector of Ward & Goldstone, Ltd., has an earthing clip on both sides, so that it can be inserted either way—back to front or vice versa.

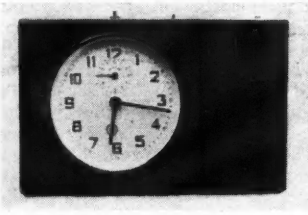
A main trend in the plug and socket field is the development of screening protection for socket outlets. The socket of the G.E.C. damper shutter plug and socket unit is fitted with a shutter which prevents the line socket tubes being uncovered until the plug is in position. The third pin of the plug operates the shutter. The socket cover prevents either the earth, line, or neutral pin being inserted into a single socket tube, thereby avoiding overhang. A wide range of Tucker switched units is now available, in which the "Tamperproof" socket-outlets are controlled by short slow-break a.c. switches, or, alternatively, by q.m. and b. switch mechanism. A development in this field is the "boxless" flush type with all live parts shrouded and dispensing with wooden boxes in skirtings and panelling.



A.E.W. combined circuit-breaker and plug and socket

In one model of the Lundberg "London Junior" s.p.

switch-plug the socket is fitted with an automatic shutter device which screens the "Sprungtung" self-adjusting contact tubes when the plug is not connected, these tubes being sunk well below the level of the front. Contactum, Ltd., produces a shutter-type switch socket. Should the plug be withdrawn without switching off, the anti-flash shutter action would give full protection against arcing. The shutter insulation is operated by a strong coiled spring with a smooth action when the plug is withdrawn. The arc-quenching screens of Crabtree three-pin shielded socket-outlets are carried on steel arms moving in recesses in the moulded cover, each independently operated by its own steel compression spring.

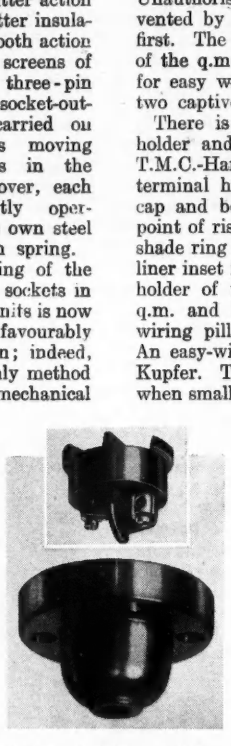


Elcap time switch

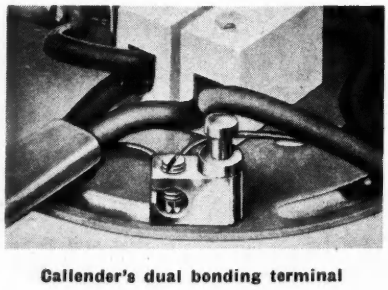
Interlocking of the switch and sockets in combined units is now more favourably looked upon; indeed, M.K. Electric, Ltd., say that interlocking is the only method to ensure complete safety. They claim that their mechanical interlocks are completely foolproof and the switch handles are extremely strong to resist abuse. Wandsworth Electrical report that their interlocked switch-plugs with automatic action continue to sell well. Tumbler-type switch-plugs by this company have q.m. and b. "underslung" switches and are available in 2-A, 5-A, and 15-A two-pin and three-pin types. The hollow-back bases give room for surplus cable, and 5-A and 15-A three-pin types have knock-outs for cable entry at the bottom and permit surface wiring without the use of a block.

The provision for adjustment of the switch-plate to plaster level is increasingly considered as important. In the new M.K. slot switches adjusting pillars permit quick and easy alignment between the switch and switchplate, despite irregularities in plaster level. Crabtree say that adjustable pillars are now extended to all compact flush switch-sockets and all deep switch boxes.

Generally, bedroom switches call for just a little extra care and attention in production and installation, and the "in the line" switch is a popular unit in this field. The "Torpedo" switch which is just being marketed by Lacrinoid Products, Ltd., is produced by a new method of injection moulding, which offers, it is claimed, several advantages over other methods of production. It is produced in a variety of attractive colours. The ceiling switch has considerable claims to bedroom use, and makes possible economy in wiring. The following points are stressed for the "Knot" ceiling switch of the Kersons Manufacturing Co., Ltd.—great convenience; safety in that it is shock-proof and fully insulated; and smooth operation at any angle.



G.E.C. bakelite ceiling rose



Callender's dual bonding terminal

All the Wandsworth shockproof single-cord ceiling switches of the standard base, 5-A q.m. and b. "underslung" type, are suitable for vertical or horizontal mounting. A strong fixing strap provides an automatic earth, and there is a robust soldered link chain with a turned metal cord connector. The Wandsworth single-cord ceiling-type switch-plug is an adaptation of the ceiling-switch movement to the standard switch-plug base. By means of the "Goltone" bed-swich, conversion attachment a light can be converted into a pendant switch attachment in a few minutes simply by inserting the special adaptor between the lampholder and lamp. The output is complete with 8 ft. of flexible cord and a pear switch ready for immediate use.

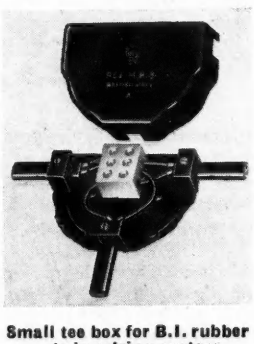
A new ceiling rose specially designed by the G.E.C. to accommodate t.r.s. flexible is fitted with a grip consisting of a split bakelite cone secured by a milled edge cap to a non-rotating cover. Another rose which is designed to fit the popular 2-inch conduit box has easily wired one-piece brasses, with a funnel-shaped lead-in and pillar terminals for the "flex," and hooks incorporated to take the weight of the pendant.

A development in the tumbler-switch field is an extension of the a.c. slow-break switch idea in the new "Wylex" switch which George H. Scholes & Co., Ltd., are first supplying with their fuse-plug system. Real silver contacts are employed, and from the "on" position when both ends of a moving bar are in contact first one end breaks with a short gap, then there is a double short break, and finally in the "off" position a wide gap at one end offers "safety by isolation." An example of locked-cover switches is the "London" underslung 5-A all-insulated switch by A. P. Lundberg & Sons, Ltd. Unauthorised removal of the brown bakelite cover is prevented by the two captive screws which have to be released first. The "Contactum" rectangular pattern 5-A switch is of the q.m. and b. positive-action type. The base is recessed for easy wiring, and an overall insulated cover is secured by two captive screws.

There is always something new to be seen in the lampholder and adaptor market. A new bakelite lampholder of T.M.C.-Harwell (Sales), Ltd., has solid plungers with square terminal heads to prevent rotation, ventilation holes in the cap and body, the shoulder of the cord-grip at the highest point of rise of the plunger to avoid straining the flex, a large shade ring which screws against the binding ring, and a metal liner inset from the edge of the holder. A new push-bar lampholder of the same make has a one-piece push-bar with a q.m. and b. action, phosphor-bronze closing contacts, easy wiring pillar terminals, and a two-piece bakelite cord grip. An easy-wiring scheme is the system introduced by W. & E. Kupfer. To wire up one simply presses the plungers together, when small holes appear in which the wires are inserted. Mere release of the plungers then secures the wires.

In the all-insulated switch lampholder of Victor H. Iddon, Ltd., the q.m. and b. action is suspended in the air, and the bakelite acts only as an outer insulating body. In the quick-wired automatic cord grip the pressure is where the bakelite cap is thickest and the cone separates the flex. In the circular cord grip the grip is by a rubber wedge inside the cap rather than at the point of entry. A small but very important advance in the design of the popular lampholder adaptor is represented by a G.E.C. improved unit. The hexagon contact plates are mounted in separate pads of bakelite so as to give free air space between the contact plates to prevent tracking. Two b.c. adaptor developments are reported by George Turnock, Ltd. In the first two, half-segments are clamped together so that an inexperienced user cannot expose the flex connections, which can easily be done with the old type of screwed cap adaptor. The second item is a 2-A 2-pin plug b.c. adaptor, intended to make it possible to use an appliance fitted with a standard 2-A plug in a lampholder if there is no socket fitted in the room. An upturned flange prevents one pin of the plug being inserted on the live side with the other one overhanging the edge, and it also prevents the pins being touched while they are still in contact with the sockets.

At this time of the year attention is given to the installation of time switches for the lighting of entrances, and in this connection the standard hand-wound and synchronous-motor time switches produced by Venner Time Switches, Ltd., for street lighting control are generally applicable. Two models with wooden cases and glass doors, however, are specially recommended for hall-lighting control and similar household use. They are 1-A and 5-A a.c. or d.c. time-switches for up to 250 V c.p. and operating "on" and "off" automatically. Each case measures 5¾ in. by 4½ in. by 4 in. projection. The "S.F.P." time switch of Elcap, Ltd., meets the need for an inexpensive yet robust equipment for switching "on" and "off" any electric circuit or appliance. Model "DF" switches off automatically at any set time and is switched on by hand, while model "DN" switches "on" automatically at any set time and is switched "off" by hand. Each model has a 30-hour clock and a capacity of 5 A. The "Mark Time" automatic time-switches Nos. 305 and 310 of the Goodliffe Electric Co., Ltd., are described as "to switch on or off" lights, fires, air conditioners, oil burners, radio, &c. A disc is revolved to effect time setting, and a toggle provides for "on" or "off" switching.



Small tee box for B.I. rubber twin wiring system

Manufacturers' Names and Addresses

Producers of equipment mentioned in our special sections

IN the preceding pages we mention the products of something like 250 electrical concerns to whom we are indebted for the great amount of information supplied. Readers who wish to get into touch with any of these will find their names and addresses in the following alphabetical list.

A.E.G. Electric Co., Ltd., 131, Victoria Street, S.W.1.
A.E.W., Ltd., Imperial Works, High Street, Edgware.
Aidas Electric, Ltd., Sadia Works, Park Avenue, North Circular Road, N.W.10.
Air Conditioning & Engineering, Ltd., 24, Palmer Street, S.W.1.
Alneco, Ltd., 229, Brearley Street, Birmingham.
Arora Co., Loughborough, Leicester.
Arrow Electric Switches, Ltd., Hanger Lane, Ealing, W.5.
Artic Fuse & Electrical Mfg. Co., Ltd., Birtley, Co. Durham.
Ashton, H., Bull's Head Passage, Market Place, Manchester.

Balcombe, A. J., Ltd., 52, Tabernacle Street, E.C.2.
Barker & Turner, Ltd., Grena Wks., Townshend Terrace, Richmond, Surrey.
Beatty Bros., Ltd., Park Royal, Willesden, N.W.10.
Beethoven Electric Equipment, Ltd., Chase Road, N.W.10.
Belgrave Electric Co., 24, Belgrave Road, Victoria, S.W.1.
Bell Fireplace Co., Kingswell Works, Northampton.
Belling & Co., Bridge Works, Southbury Road, Enfield.
Bendix Home Appliances, Inc., 4, Copthall Court, London, E.C.2.
Benham & Sons, Ltd., 66, Wigmore Street, W.1.
Benjamin Electric, Ltd., Brantwood Works, Tariff Road, Tottenham, N.17.
Berkeley & Young, Ltd., Tyseley, Birmingham.
Berry's Electric, Ltd., 85 Newman Street, W.1.
Bertram Thomas, Worsley Street, Hulme, Manchester.
Best & Lloyd, Ltd., Handsworth, Birmingham.
Best Products, Ltd., Felix Works, Felixstowe.
Bill Switchgear, Ltd., Aston Lane, Perry Barr, Birmingham, 20.
Bobin, Maurice, 78, Milton Street, E.C.2.
Bratt Colbran, Ltd., 10, Mortimer Street, London, W.1.
Bray, Geo., & Co., Ltd., Leeds.
British Electric Equipment Co., Ltd., 12, Norfolk Street, W.C.2.
British Insulated Cables, Ltd., Prescot, Lancs.
British National Electrics, Ltd., Newarthill, Lanarkshire.
British Tempovox, Holly Road, Hampton Hill, Middx.
British Thermostat Co., Ltd., Teddington Works, Windmill Road, Sunbury-on-Thames.
British Thomson-Houston, Ltd., Crown House, Aldwych, W.C.2.
British Electric Domestic Appliances (1938), Ltd., Bedal Works, Kings Way, Waddon.
British Vacuum Cleaner & Engineering Co., Ltd., Goblin Works, Leatherhead.
Brown Bros., Ltd., 20-34, Great Eastern Street, E.C.2.
Bulle Co., Ltd., 187, Tottenham Court Road, W.1.
Bulpitt & Sons, Ltd., Swansea Works, Camden Street, Birmingham.
Buncher & Haseler, Ltd., Branston Street, Birmingham.
Burgess Products, Ltd., Barwell, Leicester.
Bylock Electric, Ltd., 109, South Street, Ponders End.

Callender's Cable & Construction Co., Ltd., Hamilton House, Victoria Embankment, E.C.4.
Calvete, I., Ltd., 15, Greek Street, Soho, W.1.
Carrier Weathermakers, Ltd., 27, Conduit Street, W.1.
Carron Company, Carron, Falkirk.
Carter, H. W., & James, Ltd., Balsall Heath Works, Wenman Street, Birmingham, 12.
Castelco (Great Britain), Ltd., 91-93, Southwark Street, S.E.1.
Catena Fabrics, Peveril Street, Nottingham.
Catalin, Ltd., 3, Vere Street, London, W.1.
C.C.A. (Vacuum Cleaners), Ltd., 138, Lever Street, E.C.1.
Century Refrigeration Co., Ltd., 12, Princes Street, Hanover Square, London, W.1.
E. K. Cole, Ltd., Southend-on-Sea.
Collaro, Ltd., Culmore Works, Culmore Road, S.E.15.
Combi Electric Co., Ltd., 85, Cromwell Road, London, S.W.7.
Contactum, Ltd., Victoria Works, Edgware Road, N.W.2.
Cooper & Smith, 94, Charlotte Street, W.1.
Cooper-Stewart Engineering Co., Ltd., 136, Long Acre, W.C.2.
Co-operative Wholesale Society, Domestic Electric Appliance Department, Dudley.
Corhealux, Ltd., 60, Wardour Street, W.1.
Corfield-Sigg, Ltd., Trafalgar Works, S.W.19.
Cotto Products, Enterprise Works, Scunthorpe, Lincs.
Coventry Refrigerator Co., Northfield Works, Coventry.
Cox-Cavendish Electrical Co., Ltd., 46, Marylebone High Street, W.1.
Crabtree, J. A., & Co., Ltd., Lincoln Works, Walsall, Staffs.
Crompton Parkinson, Ltd., Bush House, Aldwych, W.C.2.

Dernier & Hamlyn, Ltd., 23, Newman Street, W.1.
Desmo, Ltd., Stafford Street, Birmingham.
"Diamond H" Switches, Ltd., Gunnersbury Avenue, W.4.
Dixon, R. G., & Co., Ltd., 116, Victoria Street, S.W.1.
Dorman & Smith, Ltd., Ordsal Electrical Works, Salford, Manchester, 5.
Downham & Co., 9, Stratford Place, Oxford Street, W.1.
Dowsing Co. (Electrical Manufacturers), Ltd., Kangley Bridge Road, S.E.26.
Drake & Gorham Wholesale, Ltd., 77, Long Acre, W.C.2.
Driver, W. T., 10, Store Street, W.C.1.
Drying Cabinets, Ltd., 25, Victoria Street, S.W.1.

East London Rubber Co., 29-33, Great Eastern Street, E.C.2.
Eastwoods, Ltd., 47, Belvedere Road, S.E.1.
Edison Swan Electric Co., Ltd., 155, Charing Cross Road, W.C.2.
Elcap, Ltd., 1, Lozells Road, Aston, Birmingham.
Electric Art Shades (1928), Ltd., Feering Factory, Kelvedon.
Electric Elements Co., Tokenhouse Yard, Bridlesmith Gate, Nottingham.
Electrical Aids (Dreadnought), Ltd., 32, Sackville Street, London, W.1.
Electrical Commodities, Ltd., Beresford Avenue, Wembley.
Electrical Components, Ltd., 102, Snow Hill, Birmingham.
Electroway Heaters, Ltd., Baxter Gate, Loughborough.
Elexcel, Ltd., Victor Works, Broad Green, Liverpool.
Eltron, Ltd., Salisbury Square House, E.C.4.
English Electric Co., Ltd., Stafford.
Eureka Vacuum Cleaner Co., Ltd., 8, Fisher Street, W.C.1.
Euston Manufacturing Co., Ltd., 56, Grove Road, Walthamstow, E.17.
Everett, Edgcumbe & Co., Ltd., Colindale Works, The Hyde, N.W.9.
Eveson Bros. (1928), Ltd., Lye, Worcs.
Express Refrigerating Co., Ltd., 179, Park Avenue, North Circular Road, N.W.10.

Falk, Stadelmann & Co., Ltd., 83, Farringdon Road, E.C.1.
Ferranti, Ltd., Hollinwood, Lancs.
Forward Electrical Co., 79, Glaney Street, Birmingham, 4.
Friedland, V. & E., 156, Fairfax Road, N.8.
Frigidaire, Ltd., Edgware Road, The Hyde, N.W.9.
Froy, W. N., & Sons, Ltd., Brunswick Works, Hammersmith, W.6.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.
General Inductance Co., 28, Fortess Road, London, N.W.5.
Gent & Co., Ltd., Faraday Works, Leicester.
Geyser Manufacturing Co. (1932), Ltd., 1, Goodwin Street, N.4.
Gilbert, A. C., & Co., 109, Kingsway, W.C.2.
Glover, J., & Sons, Ltd., 39, Groton Road, S.W.18.
Goodliffe Electric Co., Ltd., Goodtric Works, Purley Way, Croydon.
Grafton Heater Co., 9, Jays Buildings, Muriel Street, N.1.
Graham Farish, Ltd., 153, Mason's Hill, Bromley, Kent.
Greene, Phillips & Co., First Avenue House, High Holborn, W.C.1.
Guiterman, S., & Co., Ltd., 35, Aldermanbury, E.C.2.
G.V.D. Illuminators, Aldwych House, W.C.2.

Hailwood & Ackroyd, Ltd., Beacon Works, Morley, near Leeds.
Hanovia, Ltd., Bath Road, Cippenham, Slough.
Harcourts, Ltd., Stanhope House, Keen Street, London, W.C.2.
Hattersley Bros., Ltd., Queens Foundry, Swinton.
Hawkins, L. G., & Co., Ltd., 30, Drury Lane, W.C.2.
Heatrae, Ltd., St. George Street, Norwich.
Hedin, Ltd., Knighton Lane, Buckhurst Hill, Essex.
Henley's (W.T.) Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.
Hill, E. H., Ltd., 66, Fitzwilliam Street, Sheffield.
Hogan & Wardrop, Ltd., 25, Old Street, E.C.1.
Hoover, Ltd., Perivale, Middlesex.
Hotpoint Electric Appliance Co., Ltd., 24, Newman Street, W.1.
Hyders, Ltd., Plaxtol, Sevenoaks.

Iddon, Victor H., Ltd., Harper Road, Wythenshawe, Manchester.
Ideal Boilers & Radiators, Ltd., Ideal House, Great Marlborough Street, London, W.1.
International Refrigerator Co., Ltd., 54, Victoria Street, S.W.1.
Ismay Distributors, Ltd., Dagenham.
Ismay Zeros, Ltd., Dagenham.

Jackson Electric Stove Co., Ltd., 143, Sloane Street, S.W.1.
Johnson Engineering Co., 86, Great Portland Street, W.1.
J.P. Tubular Heater Co., Newarthill, Motherwell.

Kaufmann, H., Ltd., Winton House, St. Andrew Street, E.C.4.
Kelvinator, Ltd., 258, Gray's Inn Road, W.C.1.
Kent Dish Washing Machine Co., Ltd., 190, Thornton Road, Croydon.
Kersons Manufacturing Co., Ltd., Kingsbury Road, Minworth, Birmingham.
Kniveton Cable Works, Ltd., Queensway, Ponders End.
Kupfer, W. & E., 284, Finsbury Street, E.C.2.

Lacrinoid Products, Ltd., Stafford Avenue, Gidea Park, Hornchurch.
Lightfoot Refrigeration Co., Ltd., Abbeydale Road, London, N.W.10.
Lighting Trades, Ltd., 51, Garratt Lane, S.W.18.
Limit Engineering Co., Ltd., 15, Windsor Street, London, N.1.
Linealux, Ltd., 119, Cloudesley Road, N.1.
Linolite, Ltd., 96, Victoria Street, S.W.1.
London Aluminium Co., Ltd., Westwood Road, Witton, Birmingham.
London Electric Clock Co., Ltd., 15, Park Street, N.1.
Low, Archibald, Electrics, Ltd., Newarthill, Lanarkshire.
Lowne Electric Clock & Appliances Co., Ltd., Boones Street, S.E.13.
Lumsden, D. M., Millburn, Almond Bank, Perth.
Lundberg, A. P., & Sons, Ltd., 477, Liverpool Road, N.7.

McGeoch, Wm., & Co., Ltd., 46, Coventry Road, Birmingham.
MacGregor & McCallum, Ltd., 1, Newman Street, W.1.
Madison Appliances, Ltd., Windsor House, Victoria Street, S.W.1.
Magrini, Frank V., Ltd., 19, Oxford Street, W.1.
Manor Electric Oven & Fire Co., Ltd., 175, Windsor House, Victoria Street, S.W.1.
Marco Refrigerators, Ltd., Rowan Road, S.W.16.
Marelli & Co., Ltd., Artillery House, Artillery Row, S.W.1.
Marryat & Scott, Ltd., 75, Clerkenwell Road, E.C.1.
Maver Newman & Co., 51, Farringdon Road, E.C.4.
Medical Supply Association, Ltd., 167, Gray's Inn Road, W.C.1.
Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.
Mica Elements (1937), Ltd., 42, Heigham Road, East Ham, E.6.
Midland Electric Mfg. Co., Ltd., M.E.M. Works, Reddings Lane, Birmingham.
Milliwatt Heating Pad, Ltd., 32, Fleet Lane, London, E.C.4.
Mitchell Electric Co., Ltd., Meco Works, Wheeleys Lane, Five Ways, Birmingham.
M.K. Electric, Ltd., Wakefield Street, N.18.
Moffats, Ltd., India Mills, Blackburn.
Morley, T. B., & Co., Ltd., Jameson Street, Hull, Yorks.
Morphy-Richards, Ltd., St. Mary Cray, Kent.
Moseley, H. G., & Co., Ltd., Eddo Works, Hospital Street, Birmingham.

National Clock Manufacturing Co., 19, St. Bride Street, E.C.4.
National Lighting Co., Ltd., 19, St. Bride Street, E.C.4.
Nelson's (Preston), Ltd., Gillett Street, Preston, Lancs.
New Welbeck, Ltd., 93, Baker Street, W.1.
Newmectric, Ltd., 108, Victoria Street, S.W.1.
Northern Steel & Hardware Co., Ltd., Northern House, 7, Gartside Street, Manchester, 3.

Orel-Micro, Ltd., 39, Berners Street, W.1.
Orme, Evans & Co., Ltd., Great Brick Kiln Street, Wolverhampton.
Ormond Engineering Co., Ltd., Ormond House, Rosebery Avenue, E.C.1.
Osborn Mfg. Co., Ltd., 1, Masshouse Lane, Birmingham, 5.
Ozonair, Ltd., Ozonair House, Longmoore Street, S.W.1.

Parks, F. & R. G., (Lampshades), Ltd., 59, Newman Street, W.1.
Perry, Bevan & Co., Ltd., Priory Road, Aston, Birmingham.
Philco Radio & Television Corporation of Great Britain, Ltd., Perivale, Greenford, Middlesex.
Philips Lamps, Ltd., 145, Charing Cross Road, W.C.2.
Premier Electric Heaters, Ltd., Keeley Street, Birmingham.
Pressed Steel Co. of Great Britain, Ltd., Cowley, Oxford.
Prior Burners, Ltd., 1, Brandon Road, York Road, N.7.

Ransomes, Sims & Jefferies, Ltd., Orwell Works, Ipswich.
Rawlplug Co., Cromwell Road, London, S.W.7.
Raysol Electric, Ltd., 65, Basinghall Street, London, E.C.2.
Remington Rand Inc., 100, Gracechurch Street, E.C.2.
Renown Electric, Ltd., 524, Radford Road, Nottingham.
Revo Electric Co., Ltd., Britannia Works, Tipton, Staffs.
Reyrolle, A., & Co., Ltd., Hebburn-on-Tyne.
Rheostatic Co., Ltd., Farnham Road, Slough.
Rollnick & Gordon, Ltd., 80, Regent Street, W.1.
Rowlands Electrical Accessories, Ltd., 156-9, Hockley Hill, Birmingham.
Rubery Owen & Co., Ltd., Darlaston, Staffs.
Runbaken Electrical Products, 13, Liverpool Road, Deansgate, Manchester, 3.

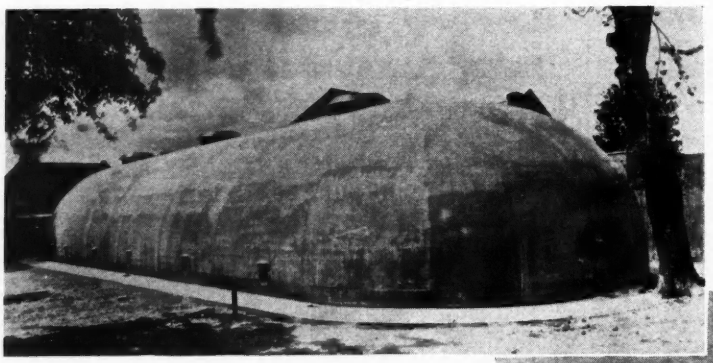
Sanders, Wm., & Co. (Wednesbury), Ltd., Falcon Electrical Works, Wednesbury.
Santon, Ltd., Somerton Works, Newport, Mon.
Schick Dry Shaver, Inc., 273, Regent Street, W.1.
Scholes, Geo. H., & Co., Ltd., Wylex Works, Wythenshaw, Cheshire.
Searsint, Ltd., 203, Regent Street, W.1.

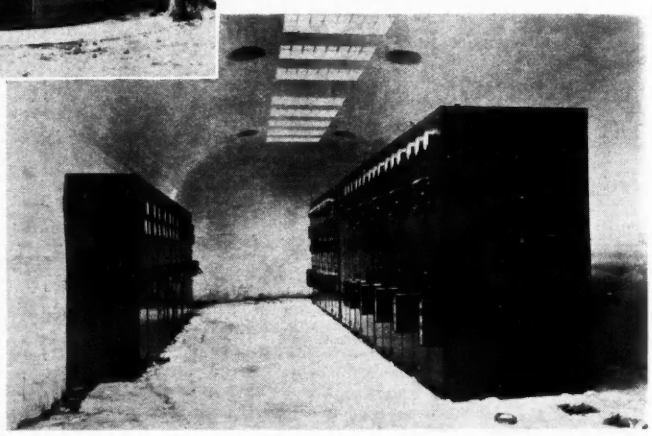
A Protected Sub-station

Novel building at Watford

WHAT is probably the first bomb-proof sub-station in this country was opened on Wednesday last at Watford. This sub-station holds a key position in the distribution system as it is a junction and distribution centre of main high-voltage feeders from the generating station to Hemel Hempstead and elsewhere and affords a low-voltage supply to part of the town.

It has been designed by Mr. A. W. Barham, the borough electrical engineer and manager, to afford protection against air raids, the building being proof against splinters from high-explosive bombs, incendiary bombs and gas. The walls are of heavy steel-reinforced concrete, being 2 ft. thick up to a point a foot above ground, gradually falling off to 6 in. thick at the top. The available space is 1,562 sq. ft., and there are two partitions of reinforced concrete 9 in. thick which strengthen the roof and separate the switchgear and transformers into fire-proof compartments. Further protection against oil fire is afforded by a number of drains under the floor leading from the switch chambers to a sump. The whole of the excavation and erection of the building was carried out by the staff of the Electricity Department.





The new Watford sub-station: Above, showing the unusual shape of the building. Right: A view of the interior

The three core-type delta-star transformers are each rated at 500 kVA and step down the voltage from 6,600 to 350/200 V. They are Metropolitan-Vickers type "ON," oil-immersed. Provision is made for variation in voltage, by tappings in the high-voltage winding, of ± 2½ per cent. and ± 5 per cent.

Cubicle type high- and low-voltage switchgear is employed, the boards being arranged parallel to the longitudinal walls of the building, both boards being divided by a fireproof partition. The 6.6-kV switchgear comprises an eleven-panel sheet steel cubicle switchboard with 350,000 kVA circuit-breakers incorporating cross-jet pot arc control devices. The breakers are spring closed, operated by a push-button switch placed on the opposite side of the fireproof dividing wall. The bus-bars, divided into two sections connected by a bus section breaker, are rated to carry 800 A. They can be sectionalised from either side of the fireproof wall.

Provision has been made for increasing the voltage if required later to 11 kV. All cables enter the sub-station in separate earthenware ducts, sixty-three separate lines of ducts being laid under the floor. Three of the incoming cables are of the split-conductor type, and the difference between the two splits in the circuit breaker is obtained by the use of a differentially wound reactor - type current transformer operating a sensitive biased "Translay" relay. The tripping supply is taken direct to each breaker so that it is not cut off if the distribution fuses blow.

Nine sheet-steel cubicles house the 400-V switchgear; the circuit-breakers of which are directly hand operated. An air-break isolator is used as a section switch. Certain main distributing cables are fed from the low-voltage switchgear direct and the remainder are supplied through three banks of Henley pillar units fitted with English Electric high-rupturing capacity fuses. Two contactors operated by a time switch driven by a synchronous motor (Watford Electric Manufacturing Co.) are used for the public lighting supplies, and the internal lighting of the sub-station can be sectionalised in case of breakdown.

Manufacturers' Names and Addresses *(Continued from preceding page)*

Shelley Potteries, Ltd., Longton, Staffs.
Siddons, J. & J., Ltd., Hill Top, West Bromwich.
Siemens Electric Lamps & Supplies, Ltd., 38, Upper Thames Street, E.C.4.
Siemens-Schuckert (Great Britain), Ltd., 30, New Bridge Street, E.C.4.
Silent Chief (Great Britain), Ltd., 14, Leicester Street, London, W.C.2.
Simplex Electric Co., Ltd., Broadway Road, Oldbury.
Singer Sewing Machine Co., Ltd., City Road, E.C.1.
Sloan Electrical Co., Ltd., 54, Fetter Lane, E.C.4.
S.L.R. Electric, Ltd., 17, Hanover Square, W.1.
Smellie, James, Ltd., Oxford Street, Dudley.
Smith's English Clocks, Ltd., Cricklewood Works, N.W.2.
Soapstone Products Co., 90, Wood Vale, S.E.23.
Sparton Refrigeration Co., Beresford Avenue, Wembley, Middlesex.
Sterne, L., & Co., Ltd., 153, Queen Victoria Street, E.C.4.
Stevens, Ernest, Cradley Heath.
Straight-Lite Reflectors, Ltd., 73a, Canonbury Road, N.1.
Sun Electrical Co., Ltd., 118, Charing Cross Road, W.C.2.
Sun-Vic Controls, Ltd., Stanhope House, Kean Street, W.C.2.
Synchronome Co., Ltd., 19, Caxton House, S.W.1.

Tellus Super Vacuum Cleaner, Ltd., 68, Victoria Street, S.W.1.
Thermal Syndicate, Ltd., Neptune Bank, Wallsend-on-Tyne.
Thermega, Ltd., 51, Victoria Street, S.W.1.
Thermics, Ltd., 392, Euston Road, N.W.1.
T.M.C.-Harwell (Sales), Ltd., 233, Shaftesbury Avenue, W.C.2.
Tok Switches, Ltd., Cambridge Place, Burrage Road, S.E.18.
Toubkin, J., Faraday House, Todd Street, Manchester.
Tricity Cookers, Ltd., Wellington House, Strand, W.C.2.
Troughton & Young, Ltd., 143, Knightsbridge, S.W.1.
Tucker & Edgar, Berkeley Works, Berkeley Road, N.W.1.
Turnock, G., Ltd., 41, High Street, Birmingham, 6.

Unity Heating, Ltd., Broadwater Road, Welwyn Garden City.
Universal Boilers & Engineering Co., Ltd., Oxford Mill, Burnley.

Vactric, Ltd., Honeypot Lane, Stanmore, Middlesex.
Valbania, Ltd., Cavendish Works, Hartington Road, South Lambeth, S.W.8.
Venner Time Switches, Ltd., Kingston By-Pass Road, New Malden, Surrey.
Vent-Axia Fans, Ltd., 9, Victoria Street, S.W.1.
Veritys, Ltd., Aston, Birmingham.
Vidor, Ltd., West Street, Erith.

Walker Fender Co., Ltd., Sherborne Street, Ladywood, Birmingham, 16.
Walsall Conduits, Ltd., Excelsior Works, West Bromwich.
Wandsworth Electrical Mfg. Co., Ltd., Imperial Works, Kenyon Street, Birmingham, 18.
Ward & Goldstone, Ltd., Frederick Road, Pendleton, Salford.
Watson & Sons (Electro-Medical), Ltd., Sunic House, 43, Parker Street, W.C.2.
Westinghouse Brake & Signal Co., Ltd., 82, York Road, N.1.
Whiteway Lighting, Ltd., 22, Bruton Street, Berkeley Square, W.1.
Wholesale Fittings Co., Ltd., 23 and 37, Commercial Street, E.1.
Wilkins & Mitchell, Phœnix Works, The Green, Darlaston.

Zeiss Ikon, Ltd., 37, Mortimer Street, W.1.

Acknowledgements

THE pictures which appear at the heads of the various sections of this issue dealing with domestic electrical equipment were taken by our staff photographer, who received valuable assistance from Mr. Robert Lee, the borough electrical engineer of St. Pancras. The Bell Investment Trust, Ltd., kindly gave us permission to photograph one of its flats in Park West, W.2, for the heading of "Better Lighting" (p. 483), while the Sun Electrical Co., Ltd., was good enough to "stage" a display to provide a picture for the section "Other Useful Devices" (page 507).

Centralised Control of Loads

The G.E.C. system

IN the system of remote-control switching developed by the General Electric Co., Ltd., a.c. at musical frequencies (*i.e.*, between 300 and 800 cycles per second) is superimposed on the a.c. or d.c. supply network. The musical-frequency supplies are obtained from a variable-speed alternator and are injected into the system mains by means of transformers connected in either the high- or low-voltage feeders. The same type of signal is used throughout, and operation is largely independent of the strength or duration of the signalling current.

Two general schemes are available, one for use on the low-voltage side of the network power transformers (400/230 V) and one for installation on the high-voltage side (3,300 to 33,000 V). In the first the secondary of the injection transformer is connected between the neutral point and the neutral wire of the main transformer; in the latter the injection transformer is connected either in series with the outgoing feeders or across the main busbars through coupling condensers. The high-voltage scheme has the advantage that the injection equipment can be installed in the power house or large sub-station which is usually attended, and the signal currents cover a larger area than with the low-voltage scheme.

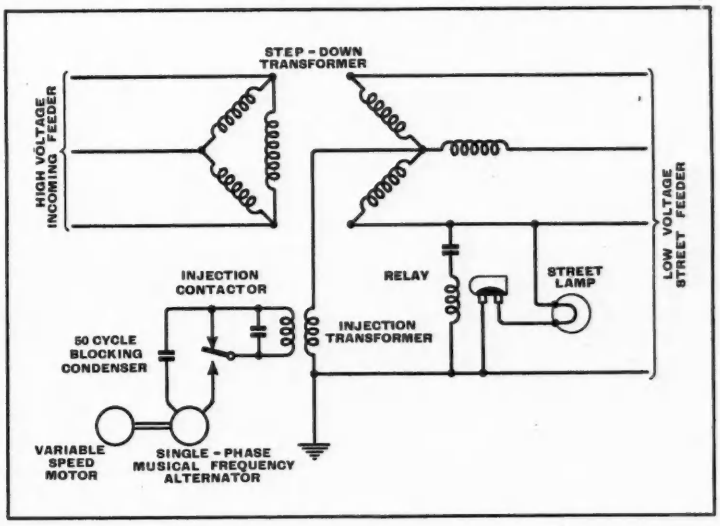
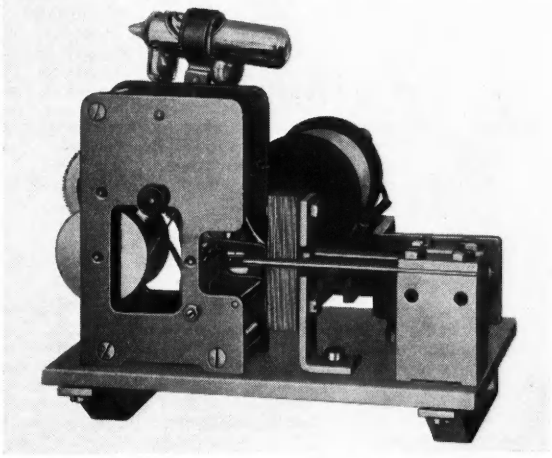


Diagram of connections showing the method of low-voltage injection on the secondary side of the power transformer

For high-voltage injection the capacity of the alternators varies from 5 to about 75 kVA, depending upon the size of the network to be controlled. The alternator is driven at various speeds to obtain the different frequencies, speed control being effected by means of a motor-generator supplying the motor driving the alternator.

Either remote electrical control or local control can be employed for starting the motor-generator. Control is then automatically taken over by relays and selectors of the type used in automatic telephone systems and sub-station supervisory gear. Correct speed is automatically obtained by operating the control switch associated with the switching operation to be performed. The sequence of operations is as follows:—When the motor is running at the correct speed for a particular signal frequency, the injection contactor closes. The alternator is thus connected to the primary of the injection transformers, and its output voltage is adjusted to the value required. The relays on the system operate within about five seconds. Finally, a master relay shuts down the equipment ready for the next operation.



G.E.C. frequency receiving relay for the control of street-lighting circuits and water-heaters

Usually six frequencies are all that is necessary, *e.g.*, for switching all public lights on, switching half-night lights off, switching main lights off, load restriction (two frequencies), and personnel call or A.R.P. purposes.

Frequencies are chosen that avoid the harmonics and resonant frequencies of the power network. False operations are prevented by the design of the relay, which has a magnetic circuit with a sharp frequency response. Frequency values between 300 and 800 cycles per second are employed in order to avoid the effects of attenuation which occurs at 2,000 cycles and higher. Further signals (frequencies) can be added without alterations or additions to the receiving relays.

A receiving relay with two tuned reeds is installed at each point to be controlled. Each reed responds to a different frequency so that two operations can be performed, such as switching a street light on and off. The operating coil is mounted on a laminated iron yoke, through the open end of which pass the tuned reeds. A cylindrical permanent magnet is included in the magnetic circuit.

The mechanism which operates a mercury switch is a complete unit attached to the left-hand side of the laminated yoke. This mechanism contains two hammers, one associated with each reed and operating upon a finely toothed ratchet wheel, which actuates a small differential spur gear, a further reduction gear operated from the centre spindle of the differential gear, and a rocker arm supporting the mercury switch. One end of the hammer is normally held just clear of the operating reed, while the other end carries a thin flat spring which engages with the ratchet wheel. When a particular frequency is impressed on the relay, one of the reeds starts to vibrate and, striking the hammer, causes the associated ratchet wheel to rotate, which, in turn, transmits the motion to the centre spindle to rock the mercury switch to either the on or off position.

I.E.E. Programmes

ARRANGEMENTS have been made as follows for the ordinary meetings in the first half of the 1938-39 session of the Institution of Electrical Engineers:—October 20th.—Dr. A. P. M. Fleming (president). Inaugural address. November 3rd.—Dr. T. E. Allibone. "The Mechanism of the Long Spark." (With demonstration.) November 10th.—H. S. Hvistendahl. "Thermal Power Plants for Peak Load and Emergency Service." November 24th.—H. C. MacEwan. "Electric Heating for Merchant Ships." November 25th.—Discussion on "Non-destructive Testing" (morning and afternoon.) December 1st.—J. A. B. Horsley and R. Nelson. "Electricity in Coal Mines." December 15th.—K. L. Wood. "Empire Telegraph Communications." January 5th.—J. I. Bernard. "The Application of Electric Heating to Domestic Hot-water Supply Systems." January 19th.—N. F. T. Saunders. "The Design of Fractional Horse-power Induction Motors."

The 1938-39 session of the South Midland Centre of the Institution of Electrical Engineers will open on Wednesday next when Mr. H. Faulkner (chairman) will deliver his address at the Grand Hotel, Birmingham. Other meetings arranged for the first half of the session (at the James Watt Memorial Institute unless otherwise stated) are as follows:—November 7th, W. J. Jones, "The Lighting Load—Its Characteristics and Development." November 25th, Grand Hotel.—Annual dinner. December 5th.—Joint meeting with the North Wales Centre of the Institution of Post Office Electrical Engineers, place to be announced later, T. C. Macnamara and D. C. Birkinshaw, "The London Television Service"; A. D. Blumlein, C. O. Browne, N. E. Davis and E. Green, "The Marconi-E.M.I. Television System." January 2nd.—J. A. B. Horsley and R. Nelson, "Electricity in Coal Mines." January 23rd.—Informal meeting.

N

New Books

Automobile Electrical Maintenance. By A. W. JUDGE. (Pp. 248; figs. 147.) London: Sir Isaac Pitman & Sons, Ltd. Price 4s. 6d.

FORMING one of a new series of books dealing with different aspects of motor-vehicle maintenance, this volume is devoted to a subject which, despite its importance, is seemingly the least understood portion of motor vehicle equipment, not merely by car owners, but by the general run of repair mechanics. The book provides ordinary motor repair mechanics —the majority of whom appear to confine their attention to the faults and troubles connected with the mechanical details of cars—with a considerable amount of instructional information which they can study in their spare time.

The author first deals briefly and lucidly with the purpose and main underlying principles of the components of automobile electrical installations, which he divides into four systems—ignition, dynamo and battery, distribution (for lamps and instruments), and the starting motor. Following this come chapters dealing separately with the details of the parts used in each of the four divisions. Although the author agrees that the coil and battery ignition system has now practically displaced the magneto on cars, he gives pride of place to the chapter on magneto ignition, the coil system being, however, fully dealt with in the subsequent one. Then come equally instructive chapters on sparking plugs, dynamos, starting motors, batteries, and lamps and other electrical accessories, each of which is illustrated by useful diagrams and drawings. Finally, there is a chapter on the location of electrical faults and a useful index.

This work can be strongly recommended to motor repair mechanics who desire to improve their knowledge and to render themselves more useful to their employers.

Two volumes have also appeared in the same series dealing with "Automobile Brakes and Brake Testing" by M. Platt and "Automobile Engine Overhaul" by A. W. Judge, priced at 3s. 6d. and 4s. 6d. respectively. They are useful books for the mechanic and should also be of service to the owner-driver who does his own maintenance.—C. J. W.

How to Use the Cathode-Ray Tube. By J. H. REYNER. (Pp. 40; figs. 33.) Boreham Wood, Herts: Furzehill Laboratories. Price 1s.

This booklet is intended to tell radio engineers concisely just what a cathode-ray is and what it will do, one of its main features being pictorial representation of the types of image obtainable in differing circumstances. The setting-up of the tube in oscilloscope form is explained, after which wave-form examination, the checking of radio circuits and valve characteristics are discussed. The last three pages contain constructional details and a circuit diagram suitably evaluated to help the student to construct an inexpensive service oscilloscope.—W. O. F.

Problems in Electrical Engineering. By S. P. SMITH. 3rd. ed. (Pp. 267.) London: Constable & Co. Price 6s.

After a lapse of some three years a new edition of this excellent work, which has already proved its value in schools and institutes, has been brought out and contains an additional 280 problems and a re-casting of the contents table. The scope has been widened by the introduction of numerous problems in light current and general technology. As in earlier editions care has been taken to include problems illustrating, or based on, principles.

An awaited improvement on the previous edition is the classification of the contents table under headings and subheadings. The author also recommends that where a class meets twice weekly one of the lectures should be converted into a tutorial class as he has found that this produces the most satisfactory results.—A. D. T.

Demonstration Experiments in Physics. By R. M. SUTTON. (Pp. 545; figs. 408.) London: McGraw-Hill Publishing Co. Price 25s.

This is a textbook of practical physics prepared for the physics laboratory with descriptions of experiments for instruction. It is of a very complete nature, containing 328 experiments in mechanics, 153 in sound, 182 in heat, 269 in electricity, 136 in light and 121 in atomic physics, which carries it beyond the scope of the usual textbook of practical physics.

This gives a wonderful selection, and the illustrations are numerous, but we fear the price in England is rather high for many educational establishments. We notice in the preface that the author has called attention to the advantages of science museums for instruction and demonstration. It is an American book so does not enumerate the British science museums available, but the advantages of these are often neglected by schools and colleges.—W. R. C.-A.

Transformatoren mit Stufenoregelung unter Last. By K. BOLTE and R. KUCHER. (Pp. 180; figs. 159.) Munich: Verlagh, Oldenburg. Price RM. 15.

In the preface to their book the authors justifiably draw attention to the fact that on-load ratio changing has been one of the most important developments in the history of transformer construction. They consider that the results of about ten years' development have been so satisfactory that they are justified in recording the process in book form.

The book is intended primarily for practical operation and construction engineers. It deals with the subject broadly as follows: Tappings and switching schemes for normal, auto and boosting transformers are described generally. Then the customary means of ratio changing by reactance and resistance methods are explained, again in a somewhat general way. Further sections are devoted to range of regulation and number of steps, and winding arrangements in regulating transformers. Construction is considered under the headings: Fundamentals of Regulator Construction, Methods of Driving Regulating Equipments, and Examples of Different Types of Construction.

The sections on basic principles are, of course, general. The illustrative examples are mainly of German products—Siemens-Schuckert, A.E.G., Koch and Sterzel, Voigt & Haeffner, Dr. Jansen, and Sachsenwerk—but mention is also made of B.T.H., Metropolitan-Vickers and G.E. (America) designs.

There is an extensive bibliography which does good justice to British and American contributions to the subjects.

The authors have made a good contribution to electrotechnical literature in a domain which has not so far received much attention. The printing and production are very good, but the diagrams in many cases are of a very elementary character. The book should be welcomed by the class of engineers for whom it was designed who are capable of reading German.—C. W. M.

Energierecht. By DR. JUR. FRIEDRICH LIST. (Pp. 156.) Berlin: Verlag Julius Springer. Price: Paper RM.6.60.

To German jurists, economists and engineers this book is indispensable, for it deals with the law now governing power generation and supply in Germany, in whatever form of energy. To readers in other countries the book is clearly of less direct concern, but it is nevertheless of very considerable interest, for it deals in effect with one of the consequences of power in general—and electricity in particular—becoming of such importance that its sociological aspects cannot be left out of account. Engineers brought power services to a level of efficiency and economy enabling them to become an essential factor in the daily life of every industrial nation. Once this stage was reached it was inevitable that government should take steps to ensure that such vital services were further developed on lines beneficial to the nation.

The measures introduced in any large country must be of interest to those concerned with the same basic problems elsewhere, and this is certainly true of Dr. List's book, for besides presenting the text and discussing the interpretation and significance of the German law, the author gives juridical consideration to the many rights, interests and responsibilities involved in the provision and operation of power supplies. Though one may not be subject to the law he expounds, most of the issues discussed may arise anywhere, and it is always interesting and often helpful to learn how they would be regarded in Germany.—R. E. N.

Shorter Notices

The transactions of the International Engineering Congress which was held at Glasgow last June have been published in quarto volume form with diagrams and a few illustrations. The 223 pages contain a list of members, the texts of the addresses and papers delivered, and short notes on the works visited. A few copies are obtainable from the Congress secretariat at 39, Elmbank Crescent, Glasgow, C.2, at 16s. each inclusive of postage.

"A Textbook of Applied Hydraulics," by H. Addison, 2nd. edition. (Pp. 435; figs. 337.) London: Chapman & Hall. Price 2s. The original purpose of this book was to present a summary of the fundamental principles of hydraulics and the manner which they are applied by the engineer. It includes much matter of interest to the electrical engineer concerned with the electric driving of pumps and turbines. The new edition has been enlarged and a new chapter is devoted to propeller and screw pumps.

"The Gantt Chart," by Wallace Clark. (Pp. 31+155.) London: Sir Isaac Pitman and Sons, Ltd. Price 5s. net.—This is the second edition of a work dealing with the principles, construction and application of the works production charts devised by Henry L. Gantt, an American pioneer of scientific management. As the preface says, the primary object of the charts is to enable work to be readily planned so as to make the best possible use of available equipment and to get the work done when it is wanted.

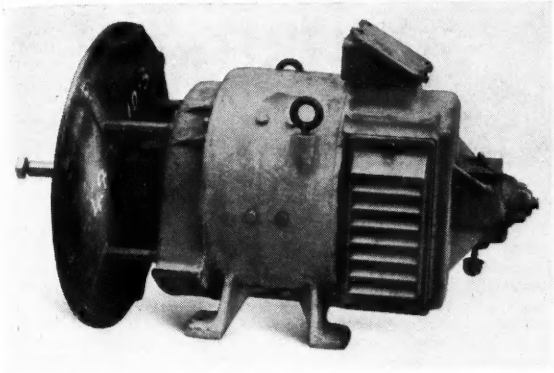
"A Simple Guide to Television," by S. A. Moseley and H. J. Barton Chapple. (Pp. 43; figs. 15.) London: Sir Isaac Pitman & Sons, Ltd. Price 1s.—This booklet commences with an endeavour briefly to answer the question: Who invented television? Those who read it will find enough to give them some understanding, from the point of view of the "man in the street," of the sequence of developments that have led up to present achievements.

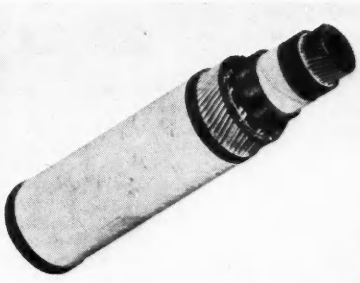
Business and Industrial Notes

E.I.B.A. Activities. Vitreous Enamellers' Conference. Industrial and Stage Lighting. Colliery Lamp Developments. Electrical Supervisors' Visits.

Some E.I.B.A. Matters

IN pursuance of the policy started a year or two ago, the Electrical Industries Benevolent Association is embarking on a second plan this autumn for the establishment of further regional committees in different parts of the country. Within the last two weeks there have been formed a committee for the Hull and East Yorkshire District, with Mr. D. Bellamy, general manager of the Hull Corporation Electricity Department, as chairman, and Mr. E. N. Parsons, also of the Hull Corporation, as honorary secretary, and a committee for Surrey with Mr. F. Woods, resident engineer of the Woking Electric Supply Co., as chairman and Mr. C. Rowbotham, engineer and manager to the Reigate Corporation Electricity Department, as honorary secretary.





(Left) 4 h.p., 370/530 r.p.m., 220 V silent type motor and (right) a section of the cable for the ring main for the "Queen Elizabeth"

A falling-off in E.I.B.A. income has been experienced in the last weeks owing to the disquiet attendant on the crisis and the preoccupation of so many people with emergency measures. Those who have temporarily put on one side matters of this kind might resurrect them, therefore, to avoid the Association having to go to the trouble of issuing special reminders, and it would be most appropriate for all who are inclined to mark their satisfaction at the preservation of peace to send a special gift, for the Association is still bearing many burdens consequent on the calamities of the last world war.

The annual ball of the E.I.B.A. is to take place on Tuesday, November 22nd, at Grosvenor House, Park Lane, London, W.1. Tickets are 25s. each and can be obtained from the Secretary.

An Effective Sign

Paddington station has been brightened by the installation of an animated sign advertising "Royal Ediswan" lamps. Constructed by Franco Signs, Ltd., it is an excellent example of the attractive brilliance of fluorescent tubular lighting and its use in the construction of such signs. The words "Royal Ediswan Lamps" are in white "Francora" fluorescent tubing and the border is in blue neon, the setting sun, formed from a red neon, changes to an illuminated pearl lamp with light rays of white "Francora."

A new "Ediswan" sign constructed by Franco Signs at Paddington station

Institute of Vitreous Enamellers

The fifth annual conference of the Institute of Vitreous Enamellers will be held at the Hotel Normandie, Knightsbridge, London, on October 28th, 29th and 30th. The conference will open with the annual general meeting, followed in the evening by a banquet and dancing. On the second day Messrs. J. G. Pearce and G. T. O. Martin will read a paper on "Scientific Aids to Vitreous Enamelling," and in the evening a visit will be made to the Palladium. The programme for the last day will consist of a motor coach trip to Hampton Court, Chertsey, Windsor, Eton, Staines, &c.

Fire Extinguishers

The range of fire-fighting appliances and accessories manufactured by the National Fire Protection Co., Ltd., Petersham Road, Richmond, Surrey, is described in a twenty-page illustrated brochure just issued. Among extinguishers of many kinds and sizes there are soda-acid types from which a stream of water is propelled by the pressure generated by the mixing of sulphuric acid with sodium bicarbonate; also a carbon tetrachloride type operated like a syringe, and large and small foam outfits. A vapour detector is made in the form of a 4.5 W palladium wire kept constantly heated by a battery. A partial vacuum is produced and as the gas to be detected slowly diffuses through the enclosing membrane a contracting chamber causes an electrical contact to "make," thus completing a circuit to a signalling device or warning bell. There is also the "Electricon" smoke detector, actuated by a ray of invisible light impinging on a photo-cell connected to a relay and amplifying circuit, which consumes 0.3 A at 110 V d.c., though other voltages or a.c. can be employed.

Electrical Equipment for the "Queen Elizabeth"

The Metropolitan-Vickers Electrical Co., Ltd., is supplying Thermotank, Ltd., with 263 motors of from ½ to 5½ h.p. for cabin ventilation in the *Queen Elizabeth*, all of the silent type as supplied for the *Queen Mary*. These have been developed for use aboard ship with the object of eliminating magnetic hum and other noises liable to be transmitted through the trunking. In addition, Metropolitan-Vickers are supplying, through Thermotank, Ltd., twenty-one motors ranging from 2 h.p. to 19 h.p. for engine-room ventilation. Eight are of the totally enclosed type for use in the air stream, driving propeller fans, and the remainder of the enclosed ventilated type. Other Metrovick motors in the new vessel include five totally enclosed deck-mounting machines for driving winches made by the Clyde Crane & Engineering Co., Ltd., six ½-h.p. motors for use with separators supplied by Alfa-Laval Co., Ltd., and several small motors for the electrically operated gymnasium apparatus.

The whole of the cable for the ring main in the ship is being manufactured by Callender's Cable & Construction Co., Ltd., at its Anchor Works, Leigh. With the exception of a similar installation, also of Callender's manufacture, on the *Queen Mary*, this is the greatest length of ring main cable ever installed in a ship and is comparable with the underground low-voltage cable network in a town. The ring main consists of 1 sq. in. rubber-insulated cable of 660-V C.M.A. grade and is partly taped, braided and fireproof-compounded, and partly lead-covered, armoured, braided and fireproof-compounded. The complete ring main, consisting of two independent sections, extends through approximately three-quarters of the length of the ship, and it has been so arranged that any part of the installation can be isolated instantly when necessary.

Ethylene Glycol

A handbook of twenty-seven pages has been published by Imperial Chemical Industries, Ltd., on the properties and uses of Ethylene Glycol. This substance is produced in five grades, one of which, known as "L.C.," has been developed as a liquid dielectric for electrolytic condensers. Its conductivity is given as 1.07×10^6 reciprocal ohms at 25 deg. C. and its chloride content at less than 0.0001 per cent., thus eliminating risk of corrosive action on the aluminium plates of the condenser.

Orders for Generating Sets

The Parsons Engineering Co., Ltd., has an order in hand for the Electric Construction Co., Ltd., for nine special-duty generating sets each consisting of a Parsons "H4S" type

petrol engine, developing 30/35 b.h.p. at 1,500 r.p.m., direct coupled through a friction type clutch to two E.C.C. alternators and an exciter. The whole of the equipment is to be mounted on a combined bed-plate for easy transit, and is an exact repeat of a number of sets supplied to this company in the past.

An order for an 8,000-kW turbine power installation for the East London (S. Africa) power station has been received by cable by the Brush Electrical Engineering Co., Ltd.

B.E.A.M.A. Handbook

We have received from the British Electrical and Allied Manufacturers' Association a copy of the new and revised edition of its handbook "Some Information." This contains lists of the president and vice-presidents, officers, committees; oversees committees; councils and committees on which the Association is represented; and membership of the sections. The standing rules and the objects of the Association, as expressed in its memorandum and articles of association (also included) are briefly given, and there is a chart of organisation, clearly indicating how the Association carries out those objects. Copies of the handbook can be obtained gratis on application to the Association, 36-38, Kingsway, London, W.C.2.

A Lighting Conference

A conference of electrical contractors from all parts of the country was held at the showrooms of Holophane, Ltd., on September 27th. The majority of the guests were members of the E.C.A. The programme opened with a welcoming address by Mr. W. T. Dean, managing director, followed by a short résumé of "Holophane General Sales Policy" by Mr. J. H. Mollan, sales manager. Dr. S. English gave a lecture on "Science Behind Holophane Glass," in which he outlined some of the work which is carried on in the company's research laboratories. Mr. E. Stroud, chief of the technical department, spoke on "Holophane Developments," which dealt with many lighting problems. After lunch at the St. Ermins Hotel Mr. L. M. Tye, Holophane industrial lighting specialist, gave a lecture on "Practical Industrial Lighting," which embraced the lighting of central stations. Mr. R. G. Williams, head of the company's colour-lighting department, then showed the guests how to combine entertainment with instruction in the matter of artistic decoration by means of light. The conference ended with a dinner at the Criterion Restaurant, presided over by Dr. English. Messrs. J. Anderson (Aberdeen) and A. R. Wilson (Bournemouth) replied to the toast of "Our Guests," proposed by Dr. English. The toast to "Holophane, Ltd.," was proposed by Mr. W. T. Hellaby, of the Birmingham Branch of the E.C.A., and this was seconded by Mr. S. Hill, Southampton.

Ninety-nine Per Cent. Discount

In sending out their new electric fittings and appliances catalogue, L. G. Hawkins & Co., Ltd., 30-35, Drury Lane, W.C.2, make a rather out-of-the-way offer. A special order form and envelope accompany the catalogue. The former is enclosed in the latter which, upon delivery, is stamped with a serial number. Every order contained in an envelope bearing a number which is a multiple of 20 is to be invoiced at 99 per cent. discount. The offer holds good for fourteen days from receipt of the catalogue. The latter is a well-produced and illustrated 82-page list, about two-thirds of which is devoted to lighting fittings.

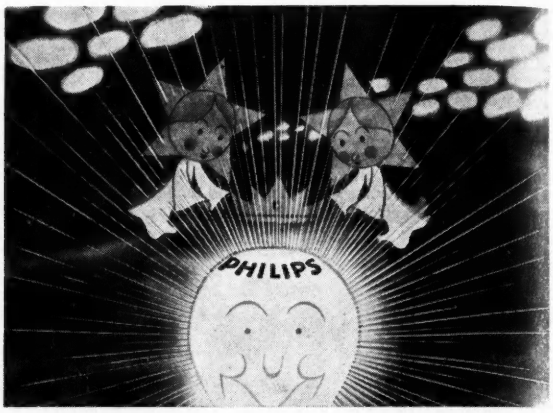
Two More Carnival Displays

In the accompanying illustrations we show two more carnival tableaux designed by electrical concerns. The decorated lorry of the St. Austell and District Electric Light & Power Co., Ltd., was awarded first prize in both the St. Austell and Fowey carnivals. The display was designed to call attention to the company's reduction to ¾d. per kWh of the secondary charge of its all-purposes tariff.

The other display was arranged by the Simplex Electric Co., Ltd., and was entered for the Oldbury carnival procession in aid of the West Bromwich and District Hospital. As our picture shows, the feature was a "Creda" electric cooker.

A Lamp Cartoon Film

We attended last week the "premiere" of a clever film which has been produced by the Philips Lamps concern as the principal feature of this season's lamp campaign. Arrangements have been made to exhibit it at 222 cinemas, to audi-



The final scene in the Philips film

ences which, it is estimated, will total between 2½ and 3 million. The film is a colour-cartoon fantasy, "Worthy Representation," telling the story of how the Philips lamp stepped into the breach when the sun overslept one morning. It shows prettily and amusingly how Nature awakens under the influence of the potent rays. We reproduce a "still" of the final scene—the crowning of the lamp which saved the situation.

Trade Announcements

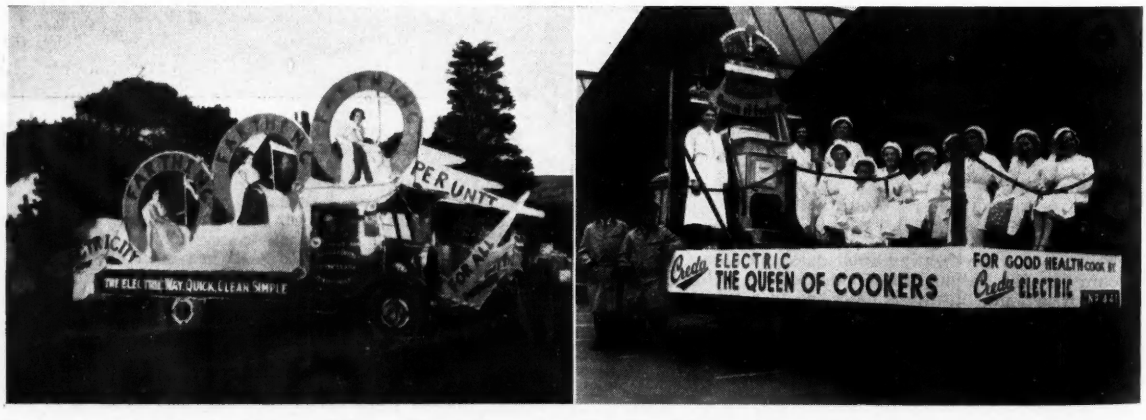
T. B. Morley & Co., Ltd., have removed their London branch to Maidstone House, 25-7, Berners Street, London, W.1. The new premises include up-to-date showrooms, offices and stores.

The business of Alklum Storage Batteries, Ltd., formerly of Halifax, has been amalgamated with that of Britannia Batteries, Ltd., and as from October 1st the latter company will sell Alklum batteries as well as Britannia batteries. Future production will have the benefit of a combination of the technical and other resources of the two companies which will be centred at Redditch. The range of Britannia and Alklum steel-alkaline batteries hitherto produced will be increased. There will be available a wide range of tubular batteries for electric vehicles, trucks, locomotives and similar duties, and flat-pocket type batteries for switch-tripping, emergency lighting, ship lighting and all other kinds of stationary work.

Lamps for Miners

Information regarding recent developments in lighting is contained in M.D. Circ. No. 115, issued by the Mines Department. Tests, made at the Mines Department Testing Station, of the new krypton-filled lamps, show increases of from 20 to 30 per cent. in lighting performance compared with argon-filled bulbs without any reduction in the life of the bulb or any increase in its current consumption. Their glass envelopes are smaller in diameter than ordinary bulbs and no alteration in the construction of the lamps or batteries is entailed, but the price of a bulb is about 2½d. more. At present they are available only in the four common ratings in hand lamps, but it is hoped that they will also become available for cap lamps.

Argon-filled lamps are manufactured to give a test life of 600 hours, but last considerably longer in service. Better light is to be obtained through an increase in efficiency by reducing the test life to 500 hours without thereby reducing the service life below 600 hours and the British Standard Specifi-



Two carnival tableaux, showing (left) a display by the St. Austell & District Electric Light & Power Co., and (right) a "Creda" cooker display

cation has been altered accordingly. Generally speaking, the illumination given by fixed lights is much superior to that given by portable safety lamps. Where the use of electric mains lighting is precluded on grounds of safety, air-turbo lamps can be used. A new mercury-vapour bulb for 100 V has recently been approved for certain types of air-turbo lamps. It gives a much higher lighting performance and a longer life than a metal-filament lamp.

Store Window Lighting

C. & A. Modes, Ltd., has recently reconstructed the show windows of its Oxford Street store, and a feature of the frontage is the installation of mercury electric-discharge lamps. There is 7,500 sq. ft. of window space and 650 lamps giving 120,000 c.p. The installation is an example of the "Realite balanced light" principle of Rowlands Electrical Accessories, Ltd. To draw attention to the new lighting scheme, the proprietors of the store recently had a full-page advertisement in one of the London evening papers.

Electron Diffraction

On October 11th Dr. J. A. Darbyshire will give a lecture before the Institution of Electronics on the subject of "Applications of X-Ray Diffraction and Electron Diffraction Methods to Industrial Research." The meeting will be held at 7.30 p.m. in the lecture theatre, King's College, Strand, London, W.C.2, and will be followed by a discussion. Tickets of admission can be obtained on application to the hon. secretary of the Institution, Mr. A. H. Hayes, 27, Fetter Lane, E.C.4.

Appointments Vacant

Borough electrical engineer for Swansea.
Borough electrical engineer for Bexley.
Draughtsman for Preston Electricity Department.
Cable jointer for Port Elizabeth (S.A.) City Council.
Two assistant rotary sub-station attendants for Weymouth and Melcombe Regis Electricity Department.
Meter tester and mechanician for Ilkley U.D.C.
Three combustion engineers for the West Midlands J.E.A.
(See our classified advertisements.)

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price October 5th.	Fortnight's inc. or dec.
a Acid Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£37	—
a Ammonia, Muriate (large crystal) ... ,,	£18 10s.	—
a Borax... ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate... ... ... ,,	6d.	—
a Shellac ... ... per cwt.	£4 8s.	—
a Sulphur, Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda, Chlorate ... ... per lb.	3¼d. to 3¾d.	—
a ,, Crystals ... ... per ton	£5 to £5 5s.	—
a Sodium, Bichromate, casks ... per lb.	4¼d. net.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£94	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ,,	1/2½ to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£181	—
Grade II ... ... ,,	£127	—
Grade III ... ... ,,	£70	—
c Brass (rolled metal 2" to 12" basis)... per lb.	8½d.	½d. inc.
c ,, Tubes (solid drawn) ... ... ,,	11½d. to 11¾d.	—
c ,, Wire, basis ... ... ,,	8¾d.	½d. inc.
c Copper Tubes (solid drawn) ... ,,	1/0¾d.	—
g ,, Bars (best selected) ... per ton	£80	—
g ,, Sheet... ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£48 10s.	10s. dec.
d ,, Wire Rods ... ... ,,	£53 5s.	10s. dec.
d ,, H.C. Wire ... per lb.	7 ⅛d.	⅛d. dec.
f Ebonite Rod ¼" dia. & up. ... ... ,,	1/10 to 2/5	—
f ,, Sheet ⅛" thick & up ... ,,	1/5 to 1/10	—
n German Silver Wire, Nos. 1 to 12 ... ,,	2/4	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para-fine ... ... ,,	7¾d.	—
i Iron, Pig (Cleveland, No. 3) ... per ton	£4 5s.	—
i ,, Wire galv. No. 1 P.O. Qual. ... ,,	£23	—
g Lead, English Pig ... ... ,,	£17 5s.	15s. dec.
g Mercury ... ... per bot.	£13 10s.	—
e Mica (in original cases) small ... per lb.	10d. to 2/–	—
e ,, ,, ,, medium ... ,,	6/- to 12/6	—
e ,, ,, ,, large ... ,,	13/- to 17/6 up	—
p Phosphor Bronze, plain castings ... ,,	1/2½	—
p ,, ,, drawn bars & rods ,,	1/0¾d.	—
p ,, ,, rolled strip & sheet ,,	11½d.	—
p ,, ,, wire ... ... ,,	1s. 1¼d.	¼d. inc.
o Platinum ... ... per oz.	£8	—
d Silicium Bronze Wire ... ... per lb.	9¼d.	⅛d. dec.
g Spelter ... ... per ton	£14 2s. 6d.	5s. dec.
g Tin, Block (English) ... ... ,,	£196 5s.	£1 10s. dec.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/6	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
i Bolling & Lowe.
n P. Ormiston & Sons
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in our "Business Notes" under the same heading.

A Delivery Truck

The accompanying illustration shows a light truck which Higgs Motors, Ltd., is using for local deliveries and service work. The opportunity has been taken to advertise the company's motors, and it will be seen that two motors are displayed, one on top of the driver's cab and a smaller one in front of the radiator. The large motor was made in the company's pattern shop out of wood in order to save weight, but

Higgs motors mounted on one of the company's delivery trucks

it is hollow and inside is a small ½-h.p. motor running at 250 r.p.m., driving a pulley which projects outside the motor and is painted with black and white circles so that it may easily be seen when revolving. The small motor on the front of the radiator runs at about 350 r.p.m. Both motors are designed to run from a 12-V supply and are operated by the starter battery.

A.S.E.E. Visits

On September 17th a private party, consisting of members of the Executive Council and others of the Association of Supervising Electrical Engineers, inspected the underground and surface electrical equipment at Betteshanger Colliery, near Deal, Kent. Descending to a depth of 2,000 ft., the party was able to observe the speed with which the cages travel and the ease of control. Both uptake and downtake shafts are operated by steam winding engines which, when later inspected, showed a speed of approximately 60 m.p.h., while the peculiarities of the special winding drums are largely responsible for the smooth braking obtained. After inspecting one of the underground pumping stations and the main substation, the party returned to the surface and saw under working conditions the screens, washery, boiler house and power station, the latter supplying current for lighting and other electrical services, while a 33,000-V overhead transmission line conveys power to Snowdown Colliery, six miles away. The visit was arranged by Mr. C. S. Magee, agent for Pearson & Dorman Long, Ltd., owners of the colliery, and appreciation was expressed to Mr. D. W. Rait, the chief electrical engineer, and Mr. W. R. Howard, his assistant, for their detailed explanation of the various equipment.

Through the good offices of Dr. Oscar Faber, consulting engineer, and by permission of the Chief of Establishments, a party of A.S.E.E. members visited the Bank of England on September 21st. The tour of inspection included the huge underground power house, pumping equipment for oil fuel for the boilers and for water supply, sewage pumps, and air-conditioning plant. The party was conducted by Mr. A. C. Purday, the chief engineer, and his assistant, who described the plant.

New Catalogues and Lists

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—A catalogue of electric baking ovens, including travelling and brick built ovens. Also a pamphlet relating to Fraser & Chalmers coal washing plant.

Goodliffe Electric Co., Ltd., Purley Way, Croydon.—List "OL9." giving details of line fittings.

L. G. Hawkins & Co., Ltd., 30-35, Drury Lane, London, W.C.2.—A coloured leaflet relating to "Supreme" and "Sunray Tricity" fires.

British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2.—Details of the "Newelite" fitting.

Londex, Ltd., Brettenham House, Strand, W.C.2.—Details of a motor-driven contact maker for syren control.

Tecalemit, Ltd., Great West Road, Brentford.—Details of the "Flexomatic" lubrication system.

International Lamps, Ltd., 173, Farringdon Road, London, E.C.1.—A catalogue of electric lamps.

Russell Newbery & Co., Altrincham.—A catalogue of stationary Diesel engines.

Resistance Welding Machines, Ltd., 68, Victoria Street, London, S.W.1.—Brochures dealing with resistance welding machines.

Bulpitt & Sons, Ltd., Swansea Works, Birmingham, 1.—A catalogue of "Swan" electric fires.

Wego Condenser Co., Ltd., Bideford Avenue, Perivale.—An explanatory booklet intended for non-technical readers dealing with power factor correction and static condensers.

Firth-Vickers Stainless Steels, Ltd., Staybrite Works, Sheffield, 9.—A leaflet describing heat-resisting steels.

Bankruptcy Proceedings

E. W. Pearson, 59, Bedford Road, Southport, electrician.—The public examination of this debtor was held on September 27th at the Court House, Government Buildings, Victoria Street, Liverpool, when the statement of affairs disclosed assets of £117 to meet liabilities totalling £213. The debtor attributed his failure to bad debts. The examination was concluded.

C. H. Chadwick, Mill Road, Cromer, Norfolk, radio dealer.—The public examination of this debtor took place on September 27th at the Shirehall, Norwich, when it was reported that the gross liabilities amounted to £1,192, of which £433 was expected to rank for dividend, with a deficiency of £262. The debtor attributed his failure to insufficient trade to cover expenses during the slack season and lack of capital. The examination was concluded.

W. C. Hanson, 78, Priory Road, Kenilworth, lately carrying on business at 37, Warwick Road, Kenilworth, under the style of Kenilworth Radio Supplies, radio engineer.—The application for discharge was heard at the Shire Hall, Warwick, recently. The Official Receiver said the receiving order was made in June, 1936. The liabilities amounted to £506, and the assets had been estimated to produce £10. That sum was insufficient to cover the costs of the proceedings. The discharge was granted subject to one month's suspension.

V. W. Henry, Acle, Norfolk, radio and electrical engineer.—This debtor filed his own petition recently and at the first meeting of his creditors held on September 30th at the Official Receiver's Office, Castle Chambers, Opie Street, Norwich, a statement of affairs was filed disclosing ranking liabilities of £761 and assets of £202, leaving a deficiency of £559. As a result of the first meeting of creditors the case, being a summary one, was left in the hands of the Official Receiver as trustee.

E. H. Armitage, 20, Green Lane, Cookridge, Leeds, traveller, lately carrying on business in co-partnership with another as an electrical factor.—Receiving order made September 21st on debtor's own petition.

First meeting October 10th at 24, Bond Street, Leeds. Public examination October 25th at the County Court House, Leeds.

S. Saunders, radio dealer, 111, Greenford Road, Greenford, Middx.—Public examination November 11th at the Court House, Half Acre, Brentford.

A. C. Hall, electrician, 65, St. Thomas's Road, Worthing.—Last day for receiving proofs for dividend October 12th. Trustee, Mr. V. R. Fletcher, 8, Old Steine, Brighton, Official Receiver.

W. A. Mather (Mathers Stores), radio dealer, 77, Widnes Road, Widnes.—Public examination October 25th at the Court House, Government Buildings, Victoria Street, Liverpool.

F. H. Pountney (Bordesley Electrical Co.), electrical engineer, 164, High Street, Bordesley, Birmingham.—Trustee, Mr. F. E. Bendall, King Edward House, New Street, Birmingham, Official Receiver, released September 21st.

A. G. Smith (separate estate), trading in partnership, with W. Smith as W. Smith & Son, 23, Crescent Street, Weymouth, electrical and radio engineers.—First and final dividend of 10½d. in the £, payable October 4th at 12, Rolleston Street, Salisbury.

Company Liquidations

Coulphone Radio Mfg. Co., Ltd.—The creditors were called together recently at the offices of Mr. J. Whitehead, 2, Chapel Street, Preston, when the statement of affairs showed liabilities of £151. The total assets were £142, leaving a deficiency of £9 so far as the creditors were concerned. The creditors decided to confirm the voluntary liquidation of the company with Mr. R. S. Aldrich, Preston, as liquidator, with a committee.

Parolle Electrical Plant Co., Ltd.—Meeting November 1st at 31, Mosley Street, Newcastle-on-Tyne, to receive an account of the winding-up by the liquidator, Mr. J. M. S. Coates.

Peterborough Radio Co., Ltd.—Meeting November 9th at Queen Street Chambers, Queen Street, Peterborough, to receive an account of the winding-up by the liquidator, Mr. J. Stephenson.

Trade Mark Applications

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from September 28th. As a result of the new Trades Marks Act, the applications are now being dealt with under two separate divisions known as Schedules III and IV:—

Daimon. No. 584110. Class 6 (III). Electric dynamos for bicycles and motor cycles; electric motors and electric fans.—Elektrotechnische Fabrik Schmidt & Co. Gesellschaft, Berlin, N. (British representatives: Boult, Wade and Tennant, 111-112, Hatton Garden, E.C.1.)

Car-Na-Var. No. 587174. Class 6 (III). Electric floor cleaning machines and electric carpet and rug cleaning machines.—The Continental Car-Na-Var Corporation, Brazil, Ind., U.S.A. (British representatives: Wm. Brookes and Son, 1, Quality Court, Chancery Lane, W.C.2.)

Diasel. No. 581386. Class 50 (III). Synthetic resins sold in the form of sheets, rods, tubes and shaped pieces, and thermo-setting moulding compositions being emulsions or solutions of synthetic resins, and adhesives in solution or emulsion form (not being articles of stationery) made from synthetic resin.—Mouldrite, Ltd., Imperial Chemical House, Millbank, Westminster, S.W.1.

Information Department

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

STAR vacuum cleaner.

NATIONAL degreasing equipment for clock mechanism.

United States Electrical Trade

Decline during first half of 1938

UNITED STATES exports of electrical machinery and apparatus during the first half of this year suffered a slight setback after two years of recovery. They totalled $51,727,000 in value against $55,125,000 in the corresponding period of 1937. This decline was more than accounted for by the drop in exports of radio material and refrigerators. Shipments of other equipment for the most part showed progress.

Comparatively new items are electric razors, and searchlights and airport beacons, which in both cases show large advances. Wind-driven generators are classified separately for the first time. In these half-yearly returns destinations are not given; the annual volume must be awaited before details of the leading markets for electrical goods can be analysed.

The total value of exports for the half-year of $51,727,000 compares with a total import of electrical goods of only $999,844 (against $1,135,000 in January-June, 1937). The chief items specified among these imports are lamps and parts.

The following table gives the export values for the first half of this year with a note of increases or decreases compared with the corresponding period of 1937:—

	Six months ended June 1938. $(000)	Inc. or dec. on 1st half 1937. $(000)
Generators, d.c.	187	− 171
Generators, a.c.	468	+ 276
Steam turbine generator sets	865	+ 840
Accessories and parts for generators	485	+ 267
Arc welding sets	502	− 22
Self-contained lighting outfits	624	− 86
Wind-driven generators	163	*
Storage batteries, 6 and 12 v.	714	− 180
Other storage batteries	299	+ 252
No 6 dry-cell batteries	90	− 29
Flash-light batteries	932	− 534
Radio B and C batteries (dry)	237	− 53
Other dry and wet cell primary batteries	83	− 3
Power transformers over 500 kVA.	316	+ 70
Distribution transformers, 500 kVA and less	396	+ 108
Instrument transformers	65	+ 10
Other transformers	239	+ 53
Battery chargers, non-rotating	104	− 21
Double-current and motor generators dynamotors, synchronous and other convertors	463	+ 172
Switchboard panels, except telephone	394	+ 159
Power switches and circuit breakers over 10 A.	1,151	+ 568
Fuses	95	+ 2
Watt-hour and other measuring meters	303	− 84
Elec. indicating instruments	459	+ 92
Elec. recording instruments	176	− 4
Other elec. testing apparatus	645	+ 80
Lightning arrestors, choke coils and parts	342	+ 56
Motors, 1/3 h.p. and under	385	+ 12
Motors over 1/3 and under 1 h.p.	156	− 12
Stationary motors, 1-200 h.p.	823	+ 31
Stationary motors, over 200 h.p.	328	+ 251
Railway motors	141	− 94
Elec. locomotives, railway, mining and industrial	421	+ 143
Station and warehouse elec. motor trucks	270	+ 199
Starting and control equipment for industrial motors	791	+ 210
Starting and control equipment for elec. railway and vehicle motors	163	+ 2
Portable electric tools	763	+ 177
Accessories and parts for motors	912	+ 52
Refrigerators and parts, household	5,604	− 1,841
Refrigerators and parts, commercial up to 1 ton	1,094	− 538
Parts for elec. refrigerators	2,990	− 8
Flashlight cases	326	− 164
Electric fans	395	+ 53
Lamps for vehicles, flashlights and Christmas trees	186	− 43
Other metal-filament lamps	434	− 103
Other electric lamps	37	+ 28
Searchlights and airport beacons	489	+ 455
Floodlights	71	+ 7
Household washing machines	1,284	+ 394
Household washing machine parts	74	+ 14
Domestic vacuum cleaners	317	+ 49
Domestic vacuum cleaner parts	188	+ 32
Other domestic motor-driven devices, except tools	338	− 46
Flat-irons	170	+ 13
Cooking ranges	163	− 4
Heaters and ovens	64	− 11
Other domestic elec. utensils	242	—
Industrial elec. furnaces, ovens and other heating devices	1,026	+ 657
X-ray tubes	160	+ 25
Other X-ray apparatus and parts	616	− 27
Other therapeutic apparatus	191	+ 30
Transmitting sets, valves and parts	1,169	+ 40
Receiving sets	4,672	− 2,977
Radio receiving valves	1,361	− 813
Receiving set components	2,668	− 889
Loudspeakers	336	− 135
Other receiving set accessories	267	− 293
Telegraph apparatus	167	− 46
Telephone instruments	103	− 30
Other telephone equipment	1,882	+ 365
Bells, buzzers and alarms	129	+ 16
Starting, lighting and ignition equipment	634	− 92
Insulating material	138	− 60
Metal conduit, outlet and switch boxes	440	− 118
Sockets, outlets, fuse blocks and lighting switches	551	+ 3
Interior lighting fixtures	546	+ 41
Exterior lighting fixtures	91	+ 8
Other wiring supplies and line material	488	+ 46
Electric razors	288	+ 252
Other electrical apparatus	3,386	− 225

* Comparative figures not available.

Electricity Supply

Lighting, Domestic, Power

Aberdeenshire.—ELECTRICITY FOR COUNCIL HOUSES.—The Property and Works Committee of the County Council has agreed to wire a number of Council houses at Tarves and Cuminestown, where an electricity supply is being made available by the Grampian Electricity Supply Co. It has also agreed to introduce street lighting by electricity at Cuminestown at a cost of £105.

Barnet.—DISCHARGE LIGHTING.—The North Metropolitan Electric Power Supply Co. is to install a number of 250-W "Osira" mercury-vapour electric-discharge lamps in the area. They will be housed in G.E.C. "Z.8425" lanterns—a design recently introduced—and mounted on tall columns.

Bedford.—DISTRIBUTION PROPOSALS.—The general supply mains are to be reinforced at a cost of £38,250. The Electricity Committee also proposes to extend the mains at a cost of £313 to the Eastern National Omnibus Co.'s garage, St. John's Street, and a sum of £228 is to be spent on an extension to a housing estate near High Street, Kempston. Permission has been obtained to borrow £2,740 for the purchase of sub-station sites.

Berwick.—UNDERGROUND CABLES.—The Town Council has approved plans by the Scottish Southern Electric Supply Co., Ltd., for underground cables in Eastern Lane, Walkergate, Coxons Lane, Parade, Ravensdowne, High Greens, Bell Tower Park and the Garden City.

Chelmsford.—MORE DISCHARGE LIGHTING.—The Town Council has decided to provide an additional twenty standards with 250-W mercury vapour lamps in Broomfield Road, from King's Road to the borough boundary, in order to bring the lighting of this portion of the road up to main road lighting standard.

Dover.—SUB-STATION.—The Rural District Council has approved plans for a transformer sub-station at Upper Street, Kingsdown, for the South East Kent Electric Power Co., Ltd.

Eastbourne.—ELECTRICITY FOR SOIL STERILISATION.—The Electricity Committee has had an application for a supply for general nursery purposes, principally soil sterilising, at Mushroom Farm, Hankham. The cost of providing the supply is estimated at £100 and a guaranteed revenue of £20 per annum for five years is proposed.

EXTENSIONS.—A supply of electricity is to be given to twenty-seven houses at Hampden Park and twenty-two proposed houses on the Chatfield estate, at a cost of £682.

Essex.—CHARGES FOR SUPPLIES TO SCHOOLS.—The Electricity, Gas and Water Sub-Committee of the County Council has interviewed representatives of the East Anglian Electric Supply Co., Ltd., regarding the charges made by that company for school installations and supplies and is hopeful of obtaining more advantageous terms in the near future.

Farnborough (Hants). — LIGHTING IMPROVEMENTS. — The Urban District Council has decided to install a number of 80-W "Osira" mercury-vapour electric-discharge lamps for street lighting. These will be housed in G.E.C. lanterns similar to those in use in Hackney.

Finchley.—SUB-STATION.—The Electricity Committee has approved an expenditure of £1,440 for the Lovers' Walk sub-station.

THERMOSTATICALLY CONTROLLED COOKERS.—As several consumers have asked for thermostatically controlled cookers these are to be provided where required at an additional charge.

Gainsborough.—HIRE SCHEMES AND DEVELOPMENT.—Means of further increasing sales are discussed by Mr. H. Breckell, the electrical engineer and manager, in his report for the past year. There is no reason why the number of kWh sold should not continue to increase, he says, but it is essential to offer every possible facility through the medium of the electricity showroom and comprehensive hire and hire purchase schemes. If the sales of energy are increased it is possible to anticipate tariff reductions, which themselves would stimulate further expansion.

Gateshead.—UNDERGROUND CABLE.—The North-Eastern Electric Supply Co., Ltd., is to lay an underground cable in The Causeway, Sheriff Hill.

Glasgow.—AIR RAID PRECAUTIONS.—The Corporation has been asked to prepare a scheme for air raid precautions, and an estimate of the cost shows that the proposals would involve an expenditure of approximately £40,088. The scheme is to be submitted to the Electricity Commissioners with an expression of opinion that a grant of 80 per cent. should be made in respect of the expenditure which will rank for Government grant instead of a grant of 50 per cent. as indicated in the communication from the Electricity Commissioners.

NEW CABLES.—The Health Committee has authorised the laying of new cables from the transformer house to the employés' cottages at Stoneyetts at an estimated cost of £824.

Liverpool.—ENGINEER'S REPORT.—Mr. P. J. Robinson, the city electrical engineer, reports that the Electric Supply Department sold 473.3 million kWh in 1937-38, an increase of 38.0 million kWh, or nearly 9 per cent. During the year approximately 76½ miles of single trench were opened by the Department for the purpose of laying high-voltage feeders and low-voltage distributors. In addition, approximately 26½ miles of overhead lines have been erected on the outside of dwelling-houses, a method which very materially cheapens the cost of distribution. In order further to develop the rural area of supply approximately 9½ miles of overhead high-voltage and low-voltage lines have been erected. An important part of the Department's development work lies in approaching house-purchasers, and there are now thirty-one demonstration houses on the various building estates. These are staffed each week-end to enable contact to be made with prospective purchasers. Advertising signs are erected and a novelty has been introduced at one of the houses in the form of a large model electric cooker and kettle placed in the front garden. The Department's area of supply now exceeds 142 square miles, the number of consumers connected at March 31st last being 172,133, an increase of 15,597 during the year. Considerable progress continues to be made in the use of apparatus for domestic purposes. Over 26,900 electric cookers, 3,890 wash-boilers, 2,890 radiators and 4,880 water heaters, supplied and maintained by the Department on rental, are connected to the mains. Of the net profit of £202,183 on the year's working £70,000 has been contributed in aid of the rates.

Mansfield.—LOAN FOR METERS.—The Electricity Committee is applying for permission to borrow £10,000 for meters.

Nelson.—LOANS.—The Town Council has authorised applications to the Electricity Commissioners for sanction to borrow £6,000 for an assisted wiring scheme, £12,000 for meters, and £6,000 for new mains and services.

Newbury.—SUB-STATION.—The Wessex Electricity Co. is to erect a sub-station in Park Way.

Preston.—BUSY YEAR.—Mr. G. A. Robertson, the borough electrical engineer, describes the past year as one of exceptional activity for the electricity undertaking, and an examination of the results discloses record progress in several directions. Total sales in the supply area were 69.7 million kWh, the advance of 9.9 million kWh in 1936-37 being the highest in the history of the undertaking, while the proportionate expansion of over 16 per cent. was also an improvement. There were increases in all classes of supply, the abnormal growth in electricity sold for motive power—24 per cent.—being due both to improved trading conditions and intensive efforts to develop this class of load. The number of new consumers was 4,018, against 3,189 in the previous year, making the total at the end of March last 41,464. The kWh sold per consumer rose from 1,597 to 1,685 and per head of the population from 332 to 388. With regard to domestic consumption, Mr. Robertson claims that, having regard to the size and characteristics of the area, the development of the cooker and wash-boiler loads is very satisfactory, but says that there is considerable scope for improvement in the water-heating consumption. Serious competition, increasing each year, in the domestic field necessitates strenuous efforts if the good results of the past are to be maintained, he asserts, and this conviction was responsible for the inauguration earlier in the year of a new canvassing section with the dual object of obtaining new consumers and persuading existing users to extend the applications of electricity in their homes. Mention is also made in the report of progress in the rural districts, which comprise a large part of the 204 sq. miles of the undertaking's area. Of the 1,971 farms 682 are connected. Bearing in mind the depressed state of the poultry industry, it is considered that the growth in rural sales is quite satisfactory.

Rochester.—ELECTRIC LIGHTING AT STROOD.—The City Council has accepted the tender of the Kent Electric Power Co. (£423 per annum) for lighting Watling Street, Strood, over a ten-year period.

Scarborough.—ELECTRIC HEATING FOR SWIMMING POOL.—A detailed report is to be submitted to the Corporation regarding the cost of heating and floodlighting the South Bay bathing pool.

Sheffield.—MERCURY VAPOUR LIGHTING TOO EXPENSIVE?—Mr. J. F. Colquhoun, the Corporation lighting engineer, has decided against the extension of the mercury vapour type of street lighting in the city. He states that it is cheaper to use filament lamps, which are now being mounted 25 ft. high on the top of tram standards on all the main tram tracks in the city.

ELECTRICITY FROM REFUSE.—A sub-committee of the Health Committee has recommended that plant having as its main purpose the production of electricity from the heat value of refuse should be installed, and that upon agreement being reached with the Electricity Department as to the disposal and price of the electricity when generated the superintendent should be instructed to prepare specifications and invite tenders from the leading makers of refuse disposal plant.

CHEAPER ELECTRICITY.—A number of reductions in electricity charges came into force on October 1st. The lighting flat rate was reduced from 4d. to 3d. per kWh and the standing charge under the inclusive rate for large business premises lowered from £10 to £7 per kW. There are modifications in the fixed charges of the power tariff (high-voltage bulk supplies) and under the domestic tariff there is now one fixed charge of £6 5s. per annum for houses of more than £75 rateable value, while the "unit" charge under the tariff is reduced from three-eighths to one-third of a penny.

Shipley.—LOANS.—The Electricity Committee has obtained sanction to borrow £7,568 for the change of system of supply in the central area and is applying for permission to borrow £2,070 for a high-voltage cable extension.

Seaside Illuminations.—EXTENSIVE GALE DAMAGE.—It is reported that in the severe gales that swept the country at the beginning of this week nearly a mile of the illumination tableaux at Blackpool were damaged, two falling on passing trams. At Morecambe and Heysham, because of the serious damage to the illuminations, they have been abandoned a fortnight before the date originally planned. At Southend considerable repairs have been necessary.

Stamford.—REDUCED CHARGES.—The Urban Electric Supply Co. has reduced its charges, the new rates being as follows: " unit " charge for domestic purposes of ¾d., with a quarterly service charge calculated according to floor area of premises; " unit " charge for domestic purposes of 1¼d., plus an annual service charge equivalent to 25 per cent. of the net rateable value; domestic water heating flat rate of ¾d. per kWh, subject to minimum annual charge of £2 and supply being used in house for other purposes; and flat rate of 7d. per kWh for lighting and 1¾d. for cooking. The new charges will come into force next quarter.

Thingoe.—OVERHEAD LINES CONTROVERSY.—The question of whether electricity mains should be overhead or underground in villages has been the subject of some discussion and correspondence in West Suffolk as was revealed at a recent meeting of the Thingoe Rural District Council. In reply to a resolution by the Council that permission should be given to the East Anglian Electric Supply Co. for the erection of overhead lines on condition that underground cables were used in the villages themselves, the company wrote to the effect that it was doing everything possible to supply rural areas with electricity but this could only be done economically by overhead lines—the method employed by most electricity undertakings throughout the country. Even by this method, however, the extensions would be barely remunerative. The company later stated that if the matter were pressed by the Council it would have to be brought before the Ministry of Transport or the scheme would have to be abandoned. At a recent meeting of the Rural District Council it was reported that the Highways Committee of the West Suffolk County Council had supported the resolution, but it was eventually decided to agree to the erection of overhead lines in the village of Barrow, which was under immediate consideration, and to consider each subsequent application on its merits.

West Bromwich.—LOAN FOR SUB-STATIONS.—The Electricity Committee is seeking sanction to borrow £10,000 for sub-stations.

York.—THERMAL STORAGE HEATING FOR MUNICIPAL BUILDINGS.—A recommendation has been made that the heating in the new municipal offices should be by electrode boilers with thermal storage cylinders, distribution being by ceiling panels.

Overseas

Formosa.—NEW HYDRO-ELECTRIC POWER STATION.—A large new hydro-electric power station has recently been completed at Suireko, on the island of Formosa, by the Taiwan Denryoku K.K. The plant so far installed comprises two A.E.G. 23,300-kVA 11,000-V alternators coupled to 30,000-h.p. Voith Francis vertical-shaft turbines, working at 360 r.p.m. under an effective head of 403 ft.

France.—A SUBMARINE TRANSMISSION CABLE.—Hitherto the electric power requirements of the island of Noirmoutiers, off the coast of France, have been met by a small power station on the island. In order that the supply may be extended to all the communes, however, a connection has recently been made with the distributing system on the mainland by means of a submarine cable, 784 yd. in length, laid between Fromentine and the island. The cable is capable of transmitting 30,000 kW.

INTERCONNECTION IN NORMANDY.—A new concern has been formed in Rouen with a capital of 10,000,000 francs and the title of the Société Normande d'Interconnexion to undertake the linking-up of the electric power distribution systems in Normandy with those of the Paris area, and those of colliery undertakings in Northern France with the large hydro-electric plants in Central France.

India.—SUPPLY PROGRESS IN TRICHINOPOLY.—Reports relating to the operation of the Trichinopoly-Srirangam Electric Supply Corporation, Ltd., and the East Tanjore Electric Supply Corporation, Ltd., for the year ended March 31st last which we have received from Seshasayee Bros., Ltd., who manage the two concerns, show that many distribution extensions were carried out. The services of the Trichinopoly-Srirangam company were extended to twenty-two new areas, the number of additional consumers (1,400) being the largest since the commencement of a public supply. At the end of March consumers numbered 5,072. High-voltage lines constructed during the year aggregated 33 miles and low-voltage lines 22 miles. Sales rose by 38 per cent. to 4.8 million kWh. Extensions to thirty-five new areas were completed during the year by the East Tanjore company. Applications far exceeded expectations and could not be coped with immediately. Additional consumers numbered 1,312, making the total 3,983. Low rates for industrial supplies induced a number of mill owners to convert their plant from oil-engine to electric drive.

New Zealand.—PROBABLE SHORTAGE OF POWER IN SOUTH ISLAND.—A report submitted to the Christchurch City Council Mr. E. Hitchcock, the general manager of the municipal electricity undertaking, reveals that in June last the Government's hydro-electric system in Canterbury experienced a maximum load of 60,520 kW. The normal plant capacity at Lake Coleridge is 34,500 kW and at Waitaki 30,000 kW, so that the recorded m.d. approached the plant capacity. If this year's increase is repeated the m.d. next year will be in the neighbourhood of 70,000 kW. Moreover, obligations to Otago and Southland will bring in new areas so that next year's peak appears certain to exceed the plant capacity, even assuming all generating units are in service and overloaded. The Public Works Department has called for tenders for two additional 15,000-kW units at Waitaki, but there is some doubt whether the water capacity will be sufficient. Mr. Hitchcock feels that there is a strong case for an adequate fuel plant as an adjunct to the hydro-electric system.

NEED FOR MORE REGISTERED WIREMEN.—For some time there has been an increasing difficulty in obtaining enough registered wiremen for the work in hand throughout the country, states the *New Zealand Electrical Journal*, adding that where new areas are being opened up, such as in the North Auckland Electric Power Board's district, work is being hampered and the installation of wiring delayed.

MERCURY DISCHARGE LIGHTING.—At Putaruru, a small township in North Island, twelve 400-W " Osira " lamps, housed in G.E.C. " Lewisham " lanterns, have recently been installed for street lighting.

Nigeria.—ELECTRICAL PROGRESS.—The Electrical Branch of the Public Works Department comprises six undertakings of which four are controlled by the Government and two by native administration. At the Government undertakings of Lagos, Port Harcourt and Enugu considerable increases in output over the previous year are reported, but at Kaduna, owing to reduced street lighting, consumption was slightly less. Construction of the Jos and Yola schemes is well advanced. At the former place a bulk supply is taken from the Nigerian Electricity Commission and at Yola an oil-engine is used. It is proposed to install oil-engine plant at Zaria, Calabar and Katsina, and nearly £45,000 is to be spent on an extension to the Lagos power station. At the two native undertakings—Abeokuta and Kano—consumption increased and the financial results were more favourable.

Russia.—NEW POWER STATION.—A power station of 90,000 kW capacity is being built at a height of some 5,000 ft. on the River Khram, 75 miles from Tiflis, South Russia. A dam 100 ft. high is to be constructed across the River Khram, and an artificial lake of 230,000,000 cubic metres of water will then be formed in the hollow of a former lake which disappeared several centuries ago. Water will flow to the turbines through a tunnel five miles long and then through a 1,100-yd. high-pressure conduit pipe. This is the first conduit pipe of such length and pressure to be built in the U.S.S.R. —*Reuter*.

Scandinavia.—WATER-POWER RESOURCES.—A meeting of water-power experts was held recently at Helsinki when the possibilities of expanded utilisation of water-power were discussed. It was stated that the known water-power resources of Norway totalled about 16 million h.p., while Sweden has 9 million h.p. and Finland about 2.7 million h.p. available in waterfalls. As far as Finland is concerned, it is calculated that the present output of the existing water-power stations may be expanded by about 0.5 million h.p. as a result of suitable water regulation and water storage. As Finland is already utilising very nearly all the water-power resources it pays to exploit, such measures are of primary importance at the moment rather than construction of new hydro-electric stations at unused waterfalls. The latest of Finland's big water-power stations is now nearing completion at Harjavalta, on the River Kumo. The normal head of the fall is 7.3 metres, equalling about 22,000 h.p., but a special dam construction will raise the head to 27 metres and with an available power of about 100,000 h.p. The station is being equipped with two Kaplan turbines having a diameter of 5¼ metres and a weight of 1,175 tons complete. The turbines will drive two 11 kV alternators of 75,000 kW together, and their annual output is estimated at 250 million kWh. Power will be distributed at 120 kV to Helsinki, Bjorneborg, Nokia, Kauttua and Vaasa. The aggregate cost of the new station will exceed the equivalent of £500,000.

Straits Settlements.—GEORGE TOWN UNDERTAKING.—In his report on the operations of the George Town (Penang) Electricity Department during 1937 Mr. T. Rogers, the municipal electrical engineer, shows that the energy sold increased by 8 per cent. to 12.6 million kWh, but the total was still below that achieved in 1929 (13.0 million kWh). In 1923 the cost of fuel per kWh sold was 1.67d., since when there has been a continuous fall to 0.35d. last year.

Traction

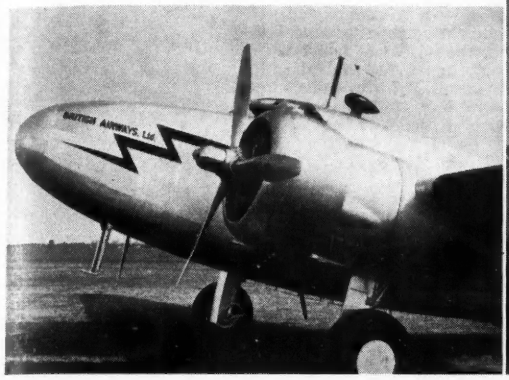
Germany. — TROLLEY-BUSES FAVOURED. — The municipal authorities of Trier have recently decided to replace the electric tramways in the town, which have been in operation since 1905-6, by trolley-buses. The municipal engineer, in an exhaustive report, has shown that this class of public transport vehicle can be operated more economically than either petrol buses or electric tramways.

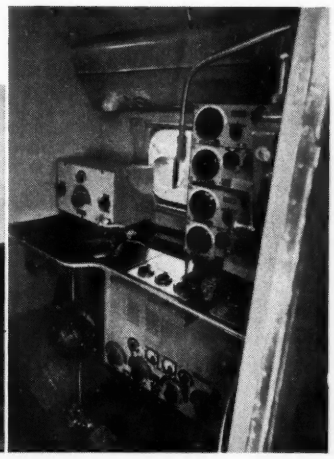
RAILWAY ORDERS.—In course of delivery to the German

State Railway, from orders placed during 1937, are 60 electric locomotives for the Nuremberg-Halle and other main lines, and 183 motor-coaches and 183 trailers for the Berlin urban and suburban lines. Also on order are 55 three-car multiple-unit trains for the Hamburg suburban railways, which are now being converted from a.c. to d.c.

Norway.—RAILWAY ELECTRIFICATION.—The Norwegian State Railway authorities are planning the electrification of the Bergen-Oslo and Bergen-Voss lines. The gross capital outlay required for the former is estimated at 41.4 million kroner, but a considerable number of steam locomotives would be relieved for other purposes. The cost of electrifying the Bergen-Voss line is calculated at 10.4 million kroner. The authorities realise that electrical operation during a number of years would be more expensive on account of interest charges, but in the long run it is estimated that about ½ million kroner would be saved annually in operating expenses.

The new British Airways machine in which the Prime Minister recently flew to Germany, showing the radio equipment





South Shields.—TROLLEY-BUS ROUTE EXTENSION.—The Transport Committee is to extend its trolley-bus service to Marsden at a cost of £1,500.

Southend-on-Sea. — ABANDONMENT OF TRAMWAYS. — At a recent meeting of the Town Council the substitution of the trams by trolley-buses at an estimated cost of £113,935 was recommended by the Transport Committee, which stated that it had decided on this recommendation in view of the very unsatisfactory condition of the tramway track and rolling stock, the heavy annual charge which has to be borne by the undertaking in maintenance, and the very considerable expenditure which would have to be incurred to relay large sections of the track and to replace vehicles. The Deputy-Mayor, Alderman W. Miles, said he understood that the Mayor's view was that a matter of this importance should be dealt with by a special meeting of the Council in the near future. Alderman Perrett, chairman of the Transport Committee, said it was very important that there should not be delay, because the time for getting an Order from the Ministry was nearing expiration. It was agreed that the matter should be deferred.

Straits Settlements.—SUCCESS OF TROLLEY-BUS SERVICES.—Last year Mr. T. Rogers, municipal electrical engineer and transport manager at George Town, Penang, reported the final change over from trams to trolley-buses on the Ayer Itam route. The small section from Waterworks to the Hill Railway station was completed early in the year and the two trams replaced by special small trolley-buses. The annual report for 1937, therefore, covers the first year's working after the complete change over from trams to trolley-buses, and it is noteworthy that new records were set up. The previous maximum traffic was in 1929 when the department carried 10,586,146 passengers for a revenue of $293,607, an average fare of 2.77 cents per passenger. During 1937 12,239,447 passengers were carried for a total revenue of $268,508, an average fare of 2.19 cents per passenger. There was a very considerable increase in traffic on all three routes, but the principal improvement was on the Ayer Itam route where the passengers carried were 4,500,711 in 1937 as against 3,234,306 in 1936. There is no doubt, states Mr. Rogers, that on this route in particular the increase in passengers was due entirely to the change over from trams to trolley-buses.

Communications

Finland.—BROADCASTING PLANS.—The broadcasting authorities have decided to replace the present small-power broadcasting station at Abo with a new 40-kW equipment, and to increase the power of the Viborg station from 10 to 20 kW. They are further asking the Government's permission to order the erection of a new national short-wave broadcasting station with an aerial output of 50 kW.

Great Britain.—ELECTRICITY FOR RADIO-TELEGRAPH STATION.—Owing to an increase in the estimated cost of electricity for the Post Office radio-telegraph station at Glengorm, Tobermory, the authorities have intimated to Tobermory Town Council that they are unable to enter into contract with the Council for the supply of electricity and will have no alternative but to install their own generating plant. Owing to difficulties regarding water rights, Tobermory Town Council intimated that it was proposed to install a Diesel engine plant at its power house and suggested a slightly higher rate than had been intended under the water power scheme. Tobermory, the first place in the Western Isles to introduce electricity, started its own municipal service on the River Aros at a cost of £5,000 twelve years ago.

AIRCRAFT RADIO EQUIPMENT.—The radio equipment of the new British Airways "Super Lockheed 14" machine in which the Prime Minister recently flew to Germany consists of a Marconi combined short and medium wave transmitter operating on wavelengths of 15-200 and 550-1,100 metres. Above this on the left is the Marconi short-wave receiver and on the right the medium wave and direction-finding receiver with remote control for the streamlined direction-finding aerial on the roof. A visual D.F. indicator is also fitted in the cockpit of the machine.

Lithuania.—ADDITIONAL BROADCASTING FACILITIES. — A new short-wave broadcasting station of 60 kW is nearing completion in Lithuania, and the authorities have recently decided to replace the present long-wave 7 kW transmitter at Kaunas with a new station of 120 kW.

Norway.—NEW TRANSMITTERS.—The Post Office recently contracted with Norsk Marconiselskap, Norwegian subsidiary of Marconi's Wireless Telegraph Co., for the construction of a 100-kW medium-wave broadcasting station which is to be erected on a site at Ullandhaug, near Stavanger. An order for increasing the present 10 kW broadcasting station at Vigra to 100 kW aerial output has simultaneously been placed with the Radio Corporation of America. The two new transmitters are to be completed by about March next.

Russia.—NEW TELEPHONE AND TELEGRAPH LINE.—The Commissariat of Communications is constructing a new telephone and telegraph line from Moscow to Khabarovsk. This will be the longest line in the world, stretching over a distance of 5,281 miles. Part of the first section, Moscow to Kuibyshev, is already completed and will be put into service in the near future. On the Moscow-Kuenga section of the route (4,225 miles) the overhead lines have been put into position.

Sweden.—SHORT-WAVE RADIO BEACONS.—Some interesting experiments have been commenced at Gotska Sandon with a view to investigating the possibilities of constructing radio beacons that will be equally useful to shipping and aviation. It is understood that the Swedish Government will be prepared to invest a substantial amount in such dual-purpose beacons.

Forthcoming Events

Institution of Electrical Engineers (*Western Centre*).—Monday, October 10th. Merchant Venturers' Technical College, Bristol. 6 p.m. Chairman's inaugural address by Mr. H. S. Ellis.

North Midland Centre.—Tuesday, October 11th. Great Northern Hotel, Wellington Street, Leeds. 7 p.m. Chairman's inaugural address by Mr. J. W. Atkinson.

Scottish Centre.—Tuesday, October 11th. 39, Elmbank Crescent, Glasgow, C.2. 7.30 p.m. Chairman's inaugural address by Mr. W. J. Cooper.

South Midland Centre.—Wednesday, October 12th. Grand Hotel, Birmingham. 7 p.m. Chairman's inaugural address by Mr. H. Faulkner.

Illuminating Engineering Society.—Tuesday, October 11th. 2, Savoy Hill, London, W.C.2. 4.30 p.m. Opening meeting and exhibition of lighting fittings.

Institution of Engineers-in-Charge.—Wednesday, October 12th. St. Bride Institute, London, E.C.4. 7.30 p.m. "Air Raid Precautions as applied to Public Buildings." Mr. J. W. Williamson.

Diesel Engine Users' Association.—Wednesday, October 12th. Caxton Hall, Westminster, S.W.1. 4.45 p.m. "The Maintenance of Diesel Plant at the Stations of the British Broadcasting Corporation." Messrs. L. Hotine and P. H. Smith.

Birmingham Electric Club.—Friday, October 14th. Grand Hotel. 7.30 p.m. Annual ladies' evening.

Physical Society.—Friday, October 14th. Imperial College of Science and Technology, South Kensington, S.W.7. 5.15 p.m. Opening meeting. Various papers.

Institution of Mechanical Engineers.—Friday, October 14th. Storey's Gate, St. James's Park, London. 6.30 p.m. Informal meeting. "Coal Utilisation Research: Co-operation between Producers, Users, and Appliance Makers." To be introduced by Mr. J. G. Bennett.

Association of Mining Electrical Engineers (*South Wales Branch*).—Saturday, October 8th. Park Place, Cardiff. 5 p.m. Opening meeting. Chairman's address by Mr. J. Jones.

Personal and Social

Information regarding new appointments and other matters of interest for this page are welcomed

WE are informed by **Mr. F. H. Smethurst** (hon. sec., Southern Division, E.P.E.A.) that the dinner given each year to the National Executive Council by his Division has been merely postponed from last Saturday to a date which he expects will be towards the end of November. All tickets were disposed of a month ago and Mr. Smethurst believes that there will be no "returns." In case there are, however, those who have been unable to secure tickets should communicate with him at 229, Old Road East, Gravesend, Kent.

Mr. R. Henderson Tate who, as we reported in our last issue, has left the staff of the British Electrical and Allied Manufacturers' Association to take up a post in the sales organisation of Sulzer Bros. (London), Ltd., served his apprenticeship with Richardsons Westgarth & Co., Ltd., of Hartlepool, where, following his work in the drawing office and the various shops, he concentrated on turbine work. Upon completion of his apprenticeship he did a special course with Amos & Smith, of Hull, in the reciprocating steam engine shops, after which he joined the Ellerman-Wilson Line as engineer, and served until 1927 on their many important shipping lines. Immediately prior to joining the staff of the B.E.A.M.A. he was engaged for three years at the Billingham Works of Imperial Chemical Industries on the design and erection work then in progress. Mr. Tate had been on the B.E.A.M.A. staff for nine years. On September 22nd he was entertained to a farewell luncheon by the Director and colleagues on the staff.

[Elec. Rev. photo.
Mr. R. Henderson Tate

Glasgow Corporation Lighting sub-committee has agreed to appoint **Mr. F. M. Hale,** B.Sc., Lond. (Physics), technical assistant in the Lighting Department at a salary of £315, rising to £395.

A large number of men and women from the Manchester works of Laurence, Scott & Electromotors, Ltd., recently paid a visit to the Empire Exhibition, Glasgow, a special train leaving Manchester soon after midnight on September 23rd and returning in the early hours of Sunday morning.

Mr. W. M. Gore has been appointed shift charge engineer at the South Lancashire Transport Co.'s power station. On leaving the Bradford Corporation, where he was a senior switchboard attendant, he was presented by the staff with an electric clock and a bookcase.

Mr. G. La Niece and **Capt. C. V. Wattenbach** have been appointed directors of Dictograph Telephones, Ltd. Both have served the company as sales representatives and subsequently as joint London branch managers for nearly twenty years.

Mr. and Mrs. P. W. Ledger leaving the church after their marriage

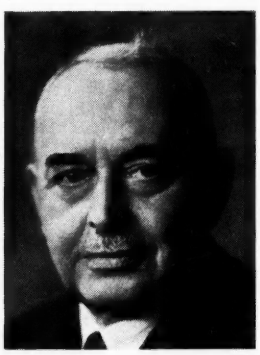
Alderman T. J. Gooding, chairman of the Leicester City Transport Department, has been nominated as the next Lord Mayor of Leicester. Alderman Gooding has spent fifteen years on the Leicester City Council and his chief work has been in connection with transport.

Mr. M. Macken, traffic superintendent with the Manchester Corporation Electricity Department, will retire on November 2nd, in accordance with the superannuation scheme.

Mr. F. Wardrop retired from the position of London sales manager of the Midland Electric Manufacturing Co., Ltd., at the end of September. His association with the company dates back to 1908 when he became joint representative for the London area, being appointed manager in 1935. The business of the company has extended greatly during his connection with it, and a staff of technical representatives covering the Greater London area is now controlled from the London office. Mr. Wardrop is not completely severing his association with M.E.M., his services being retained in a consultative capacity. **Mr. J. B. Scott,** who for the past three years has been assistant to Mr. Wardrop, has been appointed London office manager as from October 1st.

Mr. F. Wardrop

Mr. William Innes, chief engineer of the operation department (generation) of the North Eastern Electric Supply Co., Ltd., has retired after thirty-six years with the company. A native of South Shields, Mr. Innes served his apprenticeship with John Readhead & Sons, South Shields, and received the Board of Trade first-class marine engineer's certificate in 1899. He joined the then Newcastle Electric Supply Co. in 1902 and during his service was responsible, among other things, for the method of introducing boiler feed water to the top of steel tube economisers. He was a member of the Institution of Electrical Engineers, North-East (No. 1) District, Joint Board and Industrial Council for the Electricity Supply Industry; the Chimney Emission Committee appointed by the Electricity Commission in 1930; and the Special Technical Committee appointed by the Central Electricity Board in 1934.



[Phil:pson
Mr. W. Innes

The wedding took place at West Wickham on October 1st of **Miss Barbara Eve,** daughter of Mr. J. L. Eve, of the J. L. Eve Construction Co., Ltd., and **Mr. P. W. Ledger,** who is on the sales staff at the Manchester office of the Northern Aluminium Co., Ltd.

Miss M. J. Robinson, younger daughter of Mr. P. J. Robinson, city electrical engineer, Liverpool, was married on September 27th to **Mr. T. B. Roberts.**

Mr. H. R. Beasant recently resigned the position of hon. secretary of the Western Centre of the Institution of Electrical Engineers, and the Committee of the Centre proposes to make a presentation to him as an expression of appreciation of his work. Individual subscriptions (which should not exceed 5s.) should be sent to the hon. treasurer of the Centre, Major W. Roberts, 19, Windsor Place, Cardiff. It is proposed to make the presentation at the annual dinner of the Centre to be held in Bristol on January 16th.

Obituary

Mr. H. G. Massingham.—We regret to report the death at Brighton, at the age of eighty-seven, of Mr. H. G. Massingham, a well-known pioneer of the electricity supply industry and original owner of the Bath and Taunton electric light works. At the jubilee celebrations of the Taunton undertaking in 1935, Mr. Massingham stated that he gave a practical demonstration in electric lighting at Taunton in 1880, and in 1884 he arranged an exhibition of street lighting with Thomson-Houston arc lamps of 1,200 c.p. each. Public street lighting commenced in Taunton in 1885 and it is claimed to have been the first "permanent and successful" public lighting installation.

Will.—Mr. D. R. Broadbent, A.M.I.E.E, A.M.I.Mech.E., left £32,001, with net personalty of £31,889.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

Sound Equipment, Ltd.—Public company. Registered September 30th. Nominal capital, £125,000. Objects: To acquire the business carried on by Sound and Cinema Equipment, Ltd. The directors are: O. Deutsch, 5, Augustus Road, Birmingham (chairman of Odeon Theatres, Ltd.), J. Metcalfe, 112, Widmore Road, Bromley, Kent (managing director of Sound & Cinema Equipment, Ltd.), W. J. Boddy, St. Andrews, Clifton Road, Rugby, H. A. Lingard, The Glade, Green Lane, Stanmore (director of British Thomson-Houston Co., Ltd.), and C. Collins, 21, Orchard Road, Bromley (managing director of Electrical Manufacturers Finance Corporation, Ltd.). Registered office: 20, Gerrard Street, W.1.

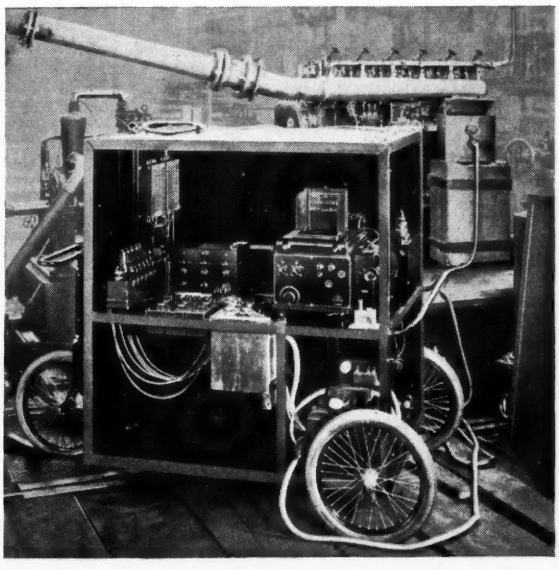
Thermat, Ltd.—Private company. Registered September 26th. Capital, £250. Objects: To acquire the registered trade mark No. 569504, being the word "Thermat," relating to goods in Class 11; and to carry on the business of proprietors of patents connected with knitted fabric in which electrical resistance wire is incorporated to enable it to be used as an electrical heating device; manufacturers of machines, fabrics, devices and processes comprised in such patents, manufacturers of electrically heated blankets and pads, underlays for carpets, &c. The directors are: F. W. Pare, 8, Premier Road, Nottingham, and A. C. Harris, 510, Broadway, Letchworth. Secretary: J. Lea. Registered office: Peveril Works, Peveril Street, Nottingham.

Walter Jones & Co. (Engineers), Ltd.—Private company. Registered September 30th. Capital, £10,000. Objects: To carry on the business of manufacturers of telephone and telegraph apparatus and for that purpose to acquire the business carried on at Charlton Works, 36, Newlands Park, S.E.26, as Walter Jones & Co., and to adopt an agreement with W. Jones. The directors are: W. Jones, 36, Newlands Park, Sydenham, S.E. (permanent governing director), and H. O. Jones, 36, Newlands Park, Sydenham, S.E. Secretary: Miss C. H. Jones. Registered office: Charlton Works, 36, Newlands Park, Sydenham, S.E.26.

Testing Diesel Engines

AN oscillographic system for checking functional variations in Diesel engines under operating conditions has been evolved by Messrs. Sulzer in Switzerland.

The equipment used consists of the transmitters, either high-frequency coils or piezo-electric quartz crystals, amplifiers, and a six-loop Siemens oscillograph of the laboratory type. To facilitate the transport of the outfit from one test bed to another in the works, part of the equipment is installed on a light truck in angle iron frames with sheet iron sides, and running on rubber-tyred wheels. This part includes the oscillograph and two low-frequency and three high-frequency amplifiers.



Sulzer mobile oscillograph unit for testing Diesel engines

Three d.c. amplifiers for measuring quartz crystal pressures are separately enclosed in wooden cases with spring suspensions to avoid the transmission of vibrations, and connected to the oscillograph truck by cables. In use, these amplifiers are placed close to the engine under test. This arrangement permits the whole test unit to be moved about without the need for dismounting it.

Hobbs Lamps, Ltd.—Private company. Registered October 1st. Capital, £100. Objects: To carry on the business of electric lamp dealers and merchants, &c. The permanent directors are: T. P. Hobbs and Mrs. E. F. Hobbs, both of 223, Norbury Avenue, Thornton Heath, Surrey. Registered office: Grafton House, Golden Square, W.1.

Bee Radio and Electric Co., Ltd.—Private company. Registered October 1st. Capital, £1,500. Objects: To acquire the business of a radio and electrical dealer carried on by C. D. Hanmore at 292, Bishopsgate, E.C. The directors are: C. D. Hanmore and Mrs. I. Hanmore, both of 46, Hazelwood Avenue, Morden, Surrey. Registered office: 292, Bishopsgate, E.C.

Dynax Engineering, Ltd.—Private company. Registered September 30th. Capital, £100. Objects: To carry on the business of manufacturers, factors, agents, mechanical and electrical engineers, moulders, machinists, ironfounders, brassfounders, &c. John W. Forbes, Little Plymyard, Seven Hills Road, Cobham, Surrey, is the first director. Secretary: E. W. Martin. Registered office: Waterloo House, 20, Waterloo Street, Birmingham, 2.

Underwood Radio, Ltd.—Private company. Registered September 29th. Capital, £1,500. Objects: To acquire the business of a radio and electrical dealer now carried on by A. E. Underwood, trading as "Underwood Radio," at 141-3, Eccles New Road, 1-3, Broad Street, and 6, Cross Lane, all in Salford. The directors are: A. E. Underwood, permanent director and chairman, 426, Wilmslow Road, Handforth, Ches, and N. Wither, 36, Houghton Lane, Swinton, Lancs. Registered office: 56, Mosley Street, Manchester, 2.

Arrow Mills, Ltd.—Private company. Registered September 29th. Capital, £500. Objects: To carry on the business of manufacturers of and dealers in furniture and electric lamp standards and fittings, wood turners, woodworkers, electricians, electrical engineers, &c. The first directors are: M. Massil, 46, Church Street, E.2, and H. Wynbourne, 26, Dobree Avenue, N.W.10. Registered office: 116, Fenchurch Street, E.C.3.

Jones & Jennings, Ltd.—Private company. Registered September 29th. Capital, £1,000. Objects: To carry on business as electrical, lighting, heating and ventilating engineers and general electrical installation contractors, wireless engineers, &c. The first directors are: R. A. Jones (permanent managing director and chairman), 4, Great Queen Street, W.C.2, and E. M. Jones, 29, Hillfield Road, N.W.6.

Wired Rediffusion Developments, Ltd.—Private company. Registered September 29th. Capital, £20,000. Objects: To carry on the business of recording, reproducing, providing means for the reception of, transmitting, and relaying sound, &c. The subscribers are: H. A. Turner, 159, Railton Road, Herne Hill, S.E.24, and D. W. Read, 33, Gwydir Road, Beckenham, Kent. Solicitors: Cardew Smith & Ross, 27, Ely Place, E.C.1.

Craven Radio & Service Co., Ltd.—Private company. Registered September 26th. Capital, £500. Objects: To carry on business as dealers in wireless sets and apparatus, &c. The subscribers are: E. A. Morgan and G. T. Prices, both of 23, Dumfries Place, Cardiff. Registered office: Dumfries House, 23, Dumfries Place, Cardiff.

A. S. Newman (Radio), Ltd.—Private company. Registered September 26th. Capital, £500. Objects: To carry on business as manufacturers of and dealers in radio and television sets and apparatus, &c. The first directors are: T. E. Fevyer, 36a, Polehill Road, Hillingdon Heath, Middx, and W. F. H. Lowen, 9, Fourth Avenue, Hayes, Middx.

Electro Methods, Ltd.—Private company. Registered September 26th. Capital, £1,000. Objects: To carry on the business of manufacturers of and dealers in all apparatus and things required for or capable of being used in connection with the generation, distribution, supply, accumulation and employment of electricity; electricians, mechanical engineers, &c. The first directors are: G. Mainzer, 2, Howitt Road, N.W.3, and C. Urban, Clarendon Mansions, East Street, Brighton, 1. Registered office: 15, Dartmouth Street, S.W.1.

Midland Micanite Manufacturers, Ltd.—Private company. Registered September 23rd. Capital, £1,000. Objects: To carry on the business of manufacturers of micanite, mica products, asbestos products, insulating materials and other like manufactures; electrical, radio, lighting, heating, water, gas, ventilating, sanitary, automobile, aviation and general electrical and mechanical engineers, &c. The permanent directors are: J. W. Benwell, "Kenwyn," Walmsley Road, Erdington, Birmingham, 24, and J. W. Wakefield, C.A. (chairman), "Diranda," Greenhill Road, Wylde Green, Sutton Coldfield. Registered office: 12, Harford Street, Birmingham, 19.

Baxter & Impey, Ltd.—Private company. Registered September 24th. Capital, £500. Objects: To carry on the business of electrical, hydraulic and mechanical engineers, &c. The first directors are: W. M. Baxter, Tile Cross, Bentley Heath, Knowle, and L. J. F. Austin, Sherington, Bickenhill Lane, Marston Green. Registered office: 55, Pershore Street, Birmingham.

Returns of Electrical Companies

Anchor Cable Co., Ltd.—Capital, £250,000 in £10 shares. Return dated June 17th, 1938. 21,334 shares taken up. £79,340 paid on 7,934 shares. £134,000 considered as paid on 13,400 shares. Mortgages and charges, nil.

W. H. Allen, Sons & Co., Ltd.—Capital, £500,000 in £1 shares. Return dated July 26th, 1938. 408,750 shares taken up. £58,757 paid. £349,993 considered as paid. Mortgages and charges, £73,128.

Crossley Brothers, Ltd.—Capital, £1,492,293 in 201.695 preference and 201,695 preferred ordinary shares of £1 each and 1,014,014 deferred ordinary and 3,341,598 unclassified shares of 5s. each. Return dated August 8th, 1938. All the preference, preferred ordinary and deferred ordinary shares taken up. £326,012 10s. paid in cash on 139,100 preference, 139,100 preferred ordinary and 191,250 deferred ordinary shares, £330,881 considered as paid on 62,595 preference, 62,595 preferred ordinary and 822,764 deferred ordinary shares. Mortgages and charges nil.

Chloride Electrical Storage Co., Ltd.—Capital, £1,250,000 in £62,000 6 per cent. preference stock, £791,100 "A" ordinary stock, £297,603 "B" ordinary stock, and 99,297 unissued shares of £1 each. Return dated June 17th, 1938. All preference and ordinary stock issued. £207,200 paid on £48,750 preference, £92,913 "A" ordinary stock, and £65,537 "B" ordinary stock. £943,503 considered as paid on the remainder. Mortgages and charges nil.

Cawnpore Electric Supply Corporation, Ltd.—Capital, £547,986 in 200,000 preference and 347,986 ordinary shares of £1. Return dated June 6th, 1938. 200,000 preference and 200,000 ordinary shares taken up. £325,000 paid on 200,000 preference and 125,000 ordinary, £75,000 considered as paid on 75,000 ordinary. Mortgages and charges: £300,000.

Austin Brothers Electrical Co., Ltd.—Capital, £1,000 in 300 preference and 700 ordinary shares of £1. Return dated July 21st, 1938. All shares taken up. £700 paid. £300 considered as paid. Mortgages and charges nil.

Advance Electrical Co., Ltd.—Capital, £1,000 in £1 shares. Return dated June 30th, 1938. All shares taken up. £1,000 paid. Mortgages and charges nil.

Nelson Brothers, Ltd.—Capital, £2,000 in £1 shares. Return dated July 7th, 1938. 1,998 shares taken up. £1,998 paid. Mortgages and charges nil.

Berry's Electric, Ltd.—Capital, £225,000 in 10s. shares. Return dated July 28th, 1938. 282,007 shares taken up. £1,003 10s. paid, £140,000 considered as paid. Mortgages and charges: £51,700.

Bailey & Incleden (1930), Ltd.—Capital, £2,000 in £1 shares. Return dated April 11th, 1938. 1,106 shares taken up. £3 paid, £1,103 considered as paid. Mortgages and charges: £200.

Petbow, Ltd.—Fourth debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated September 22nd, 1938, to secure all amounts due or becoming due up to a maximum of £1,000. Holders: Ellis J. Heilbron, Albert E. Heilbron and Granville Heilbron, all c/o The Bank of Scotland, Sauchiehall Street, Glasgow.

Contactor Switchgear, Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated September 21st, 1938, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd.

N.E.P., Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated September 20th, 1938, to secure £2,900. Holder: A. M. Owens, 263, Rotten Park Road, Edgbaston, Birmingham.

E. Leaverland, Ltd.—Satisfaction in full on July 18th, 1938, of debenture dated November 15th, 1937, and registered December 6th, 1937. (According to the register of mortgages the debenture registered December 6th, 1937, originally secured £200).

City Notes

The Carrier Engineering Co. reports a trading profit for the year to June 30th of £77,754, as compared with £90,085 in the preceding year, to which is added investment income, &c., of £8,669, and, after deducting patent fees and depreciation, there is a net profit of £82,346 (against £91,386). The balance brought in is £26,855. Income tax and N.D.C. require £1,226, and it is proposed to pay an ordinary dividend for the year of 25 per cent. (against 50 per cent.), and to carry forward £66,094. A *précis* of the chairman's speech at the forthcoming meeting on October 10th is issued with the report. In this Mr. S. L. Groom (chairman) states that, owing to the international uncertainty, the board took the precaution of recommending the lower dividend for immediate payment. Should circumstances permit, it is proposed to depart from the usual practice of declaring annual dividends and to consider the payment of an early interim dividend. Orders are now coming in, and the benefit of the expenditure last year should be reflected in the accounts for the current year.

The St. Austell & District Electric Lighting & Power Co., Ltd., has declared an interim dividend of 5 per cent., less tax, on ordinary shares Nos. 301 to 7,000, 20,001 to 30,000 and 47,001 to 70,300 (same). No dividend is declared in respect of the half-year ended June 30th on ordinary shares Nos. 110,301 to 120,300 issued in May, 1938; the amount of dividend due would be very small and it is anticipated that the first dividend on these shares will be declared in May, 1939, when it will be calculated as accruing from due date of payment of calls.

The British Columbia Power Corporation.—The consolidated statement shows that the net revenue for the year ended June 30th amounted to $4,456,509, as compared with $4,503,086 in the previous year, after providing for taxes, depreciation and renewals. Bond interest, amortisation of bond discount, and preference dividends absorbed $2,412,641 (against $2,736,857) and dividends paid on class "A" shares took $2,000,000 (against $1,700,000), leaving a surplus for the year of $43,867 (against $66,228).

The Sun Electrical Co., Ltd., reports a trading profit for the year to April 30th of £25,583, as compared with £24,847 in the preceding year, and a net profit of £19,445, after providing for depreciation and N.D.C. (against £19,219), to which is added £4,792 brought in. The ordinary dividend is maintained at 5 per cent., general reserve receives £2,000 and £5,196 is carried forward. The report states that the turnover was slightly higher despite a fall in the radio section.

Electric & Musical Industries, Ltd., announces that the profit for the year ended September 30th, subject to audit, amounts to £146,000, as compared with £363,964 in the preceding year. It is proposed to pay a dividend of 5 per cent. on the ordinary shares (against 10 per cent.).

Joseph Lucas, Ltd., report a net profit for the year to August 7th of £319,626, after making allowance for tax and N.D.C., as compared with £348,798 in the preceding year. The ordinary dividend is maintained at 15 per cent., general reserve receives £75,000, and £80,581 is carried forward (against £69,385 brought in). Meeting: October 26th in Birmingham.

The Ransome & Marles Bearing Co. reports a trading profit for the year to June 30th of £219,953, and other income of £1,881, making a total of £221,834, as compared with £222,107 in the previous year. The net profit is £153,528 (against £166,351). The final dividend is 11 per cent., making 20 per cent. for the year (same), general reserve receives £32,586, and the balance carried forward is £61,609, against £46,742 brought in.

The Lightfoot Refrigeration Co., Ltd., reports a net loss for 1937 of £11,351, as compared with a loss of £33,181 in the preceding year, increasing the debit carried forward to £73,171. The report states that reforms introduced by the board have resulted in economies and that the full benefit of these will be shown in future years' accounts.

Erinoid, Ltd., has decided not to recommend any final dividend on the ordinary stock in respect of the year ended July 31st. An interim distribution of 2 per cent. was made in May last. For the whole of 1936-37 8 per cent. was paid.

The Calcutta Tramways Co., Ltd., has announced an interim ordinary dividend of 3 per cent. (same).

The Hankow Light & Power Co. has announced a final dividend on the ordinary shares of 2½ per cent., and a dividend on the deferred shares of 5s. per share.

The Woking Electric Supply Co., Ltd., has announced an interim dividend of 3 per cent., tax free (same).

Ericsson Telephones, Ltd., has declared an interim ordinary dividend of 6 per cent., tax free (same).

The Perak River Hydro-Electric Power Co. proposes to pay a dividend of 6 per cent. on the ordinary shares for the year ended July 31st (against 7 per cent. in the previous year).

The Rawlplug Co. is maintaining its interim ordinary dividend at 10 per cent.

Marconi's Wireless Telegraph Co., Ltd., announces interim dividends of 3½ per cent., less tax, on the ordinary capital and 3½ per cent., less tax, on the preference share capital.

The British Thermostat Co., Ltd., has declared an interim dividend of 6⅜ per cent. (same).

Stocks and Shares

TUESDAY EVENING.

THE rolling away of the war clouds had an immediately beneficial effect upon Stock Exchange prices, which on Friday in last week spurted in a manner which reflected the relief felt by most classes of the community at the escape from war. The first rush to buy shares was succeeded, however, by a more calm consideration of the outlook. From the beginning of this week, hopes of increased activity in Stock Exchange markets were disappointed. The volume of public demand fell off materially, nor was there any particular anxiety shown on the part of the public to continue the feverish buying of shares. Some people talked of the certainty that income tax will be increased; others hinted at the possibility of an early General Election; a third group took a Duff-Cooper view of the outlook. Although a good deal of small buying went on, it was not sufficient to counteract the effect produced by a fair amount of selling. As compared, however, with the prices of a week ago, to-day's quotations show numerous, and in many cases substantial, gains.

Gilt-edged

Any necessity for maintaining fixed minimum prices for gilt-edged stocks quickly evaporated on Wednesday evening. These prices had been agreed upon by dealers in the Consol market as a precaution against the risk of there being a demoralising collapse in the event of panic selling. As one instance of the agreement, it was arranged that no dealings should take place in War Loan below 93. On news of the Munich invitation, the quotation was promptly hoisted to 99 and is now 101 after being 102. The crisis has left its mark, however, upon the gilt-edged stocks which are quoted under the heading of "Public Boards" in our price lists. Some of the declines were very heavy, but a start towards replacement of the losses has been made, the best example being a gain of 4 points in London Electric Transport 2½ per cent. guaranteed stock. This now stands at 91½. On the other side, West Midlands 5 per cent. stock has relapsed 8½ points to 102½, following the drop of 12½ last week in London and Home Counties 4½ per cents. Central Electricity issues are steady. London Passenger Transport "A" stock has recovered 3½, the "B" stock 7, while the speculative "C," at 76, is 3½ better.

With the Premier's emphatic insistence upon national defence being carried on more vigorously than ever, it would seem impossible to avoid a fairly heavy new issue of British Government stock in the near future. Payment has also to be made of the 40 or 50 million pounds which last month's preparations for war cost the country. Moreover, the proposed loan to the Czechs has to be provided. Holders of fixed-interest securities are feeling, it may be, none too happy at the

prospect for the probable movement of prices of their securities, but Stock Exchange brokers have found that substantial sums are going into the best class stocks.

Electricity Supply

The recoil in quotations for home electricity supply shares had been less far reaching than that in most other parts of the industrial markets. The upswing has left few remaining traces of the crisis, most prices recovering to the levels of a fortnight or three weeks ago. County of London ordinary shares, North Metropolitans, Scottish Power and Clyde Valley are amongst those to show material advances. In the Overseas group, a recovery of 6s. 3d. occurred in Victoria Falls ordinary shares. It may be of interest to mention that there has been a little French buying of Victoria Falls shares by Paris investors who are varying their gold mining purchases with high-class South African industrials, of which Victoria Falls is, of course, an outstanding example.

Equipment and Manufacturing

Industrial markets lost no time in shedding the equivalent of the war risk. Nominal quotations gave way to higher and more businesslike prices, to the accompaniment of quite a lively flow of orders. On the average, prices are up to where they were in the early part of August. Electrical equipment shares were well in the van of the advance. No small part of last week's loss was due to marking down of prices without any but a negligible number of shares changing hands. As soon as the skies cleared, the previous declines were simply replaced. At the same time, the small amount of panic selling which did actually take place had the effect of forcing down such shares as General Electrics, Associated Electricals, Callenders, and others of similar type, to prices which would have been difficult to justify even if war had broken out.

The crisis went to show that some people evidently lost their sense of financial values, the overwhelming desire being to turn shares into cash. On the rebound, as may be well imagined, a great many people endeavoured to pick up shares at the lowest levels that obtained last Wednesday, with the result that, for a time, wide prices were quoted and buyers found almost as much difficulty in dealing at reasonable quotations as previously had been the experience of the would-be sellers.

"Emmies" Dividend

The less hopeful predictions were fulfilled by the Electric and Musical Industries dividend and profits. The distribution is halved, as compared with last year's, at 5 per cent. According to the preliminary statement, profits have fallen by about 60 per cent. Radio and gramophone companies are known to have been going through hard times, but the results are poorer than many people had been looking for. Thus it is that "Emmies" are among the shares left behind in the recovery of markets. At 10s. 6d. they pay about 5 per cent. on the money at the new dividend rate.

According to report, the recent war scare exercised a marked effect upon the sales of radio sets. Dealers and suppliers are said to have found a sudden pressure of demand. Although it might have been thought that everyone possessed a wireless set, the appetite for news proved so keen as to disclose an unexpected number of people who had not previously indulged in what is now a necessity rather than a luxury.

Perak River Power

In anticipation of the report, it is generally supposed that the reduction in this company's ordinary dividend from 7 per cent. to 6 per cent. reflects a quieter year's activity in the tin mines of the district. The latter take the bulk of the output from the hydro-electric and steam stations. On the other hand, it is remembered that an issue of fresh capital was mentioned, a year ago, as likely to become necessary at about the present time. Conditions in the new issue department being what they are, there would be little surprise if the dividend decision proves to represent less a falling-off in profits than a husbanding of the resources. Industrial markets have lately seen one or two instances of action on these lines. At this time last year the Perak Company's chief concern was how to cope with the growing demand for its electricity. The price of the shares has eased off to 20s. 6d., still cum-dividend.

Miscellaneous Matters

Cable and Wireless ordinary and preference stocks signalised the Munich agreement by spurting 5 points each, the former to 42⅛ and the preference to 92½. The stocks come almost automatically to mind when talk runs on the possibility of freer international trade. Last week's hectic flow of communications is expected to put a better face on the next monthly traffics index. Globe Telegraph ordinary, at 30s., and Great Northerns, at 41, are each better. In the traction group, British Electric Traction deferred cleared off the previous week's drop of 150 points and actually added another 100 points before reacting, to a comparatively slight extent, to 975. The preferred recovered 15 points, to 165.

American trade prospects have again brightened, but Wall Street sentiment is no more than quietly bullish. Trouble in Europe is held to be a bull point for American industry. This is well recognised in the New York Stock Exchange, where, however, speculation is chary of encouraging, in any but cautious measure, an optimistic disposition.

Share List of Electrical Companies

	Nom.	Dividend. Previous.	Last.	Price Oct. 4	Rise or Fall.	Yield p.c. £ s. d.
Home Electricity Companies.						
Bournemouth and Poole	1	15	15	66/3	+⅛	4 10 7
City of London	1	7½	7½	31/–	—	4 16 9
Clyde Valley	1	7	8	36/3	+3/9	4 8 4
County of London	1	10½	10½	47/6	+6/3	4 8 5
Edmundson's 7% Pref.	1	7	7	32/6	+⅛	4 6 2
Do. Ord.	1	9	9	26/6	+1/6	—
Elec. Dis. Yorkshire	1	9	9	42/6	—	4 4 8
Elec. Fin. and Securities	1	12½	12½	50/–	—	5 0 0
Elec. Supply Corporation	1	11	12	53/9	—	4 9 5
Lancs Light and Power	1	7½	7½	31/3	+9d.	4 16 0
Lond. Assoc. Electric	1	—	7	30/9	+9d.	4 11 4
London Electric	1	8	7	34/–	—	4 2 4
London Power Deb. Red.	Stock	5	5	103½	+2½	4 16 7
Metropolitan	1	10	12	47/6	+1/8	5 1 1
Midland Counties	1	8	8	37/6	+⅛	4 5 3
Mid. Elec. Power	1	8	9	40/9	—	4 8 3
North Eastern Electric Ordinary	1	7	7	32/–	+2/–	4 7 6
Do. 7% Pref.	1	7	7	32/6	+⅛	4 6 2
Northampton	1	10	10	46/3	—	4 6 7
Notting Hill 6% pref.	10	6	6	13½	—	4 9 0
North Met. Elec. Ordinary	1	10	10	48/3	+3/3	4 3 0
Do. do. 6% Pref.	1	6	6	29/-	—	4 2 9
Scottish Power	1	8	8	37/–	+4/–	4 6 6
South London	1	7	7	31/6	—	4 9 0
Victoria Falls Ord.	1	12	13½	71/3	+6/3	3 14 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	18/9	+½	8 0 0
Yorkshire Elec.	1	8	8	40/6	+2/–	3 19 3
Public Boards.						
Central Electricity, 1950–70	Stock	5	5	111	—	4 10 1
Do. 1955–75	,,	5	5	112½	– 1½	4 9 0
Do. 1951–73	,,	4½	4½	109	+½	4 2 2
Do. 1963–93	,,	3½	3½	98	—	3 10 0
London Elec. Trans. Gtd.	,,	2½	2½	91½	+4	2 14 8
London & Home Counties, 1955–75	,,	4½	4½	97½	—	4 12 4
London Passenger Transport, A	,,	4½	4½	116½	+5½	3 17 4
Do. do. B	,,	5	5	116½	+7	4 5 10
Do. do. C	,,	4	4½	76	+3½	5 11 10
West Midlands Joint Elec. 1948–68	,,	5	5	102½	–8½	4 17 7
Telegraph and Telephone.						
American Tel. & Tel.	$160	9	9	149½	+6	6 0 8
Anglo-Am. Tel. Pref.	Stock	6	6	106½	+½	5 12 8
Do. Def.	,,	1½	1½	25	+1	6 0 0
Cable & Wireless 5½% Pref.	,,	4½	5½	92½	+5	5 19 0
Do. Ord.	,,	—	4	42½	+5	9 8 4
Do. Income	,,	—	—	101½	—	3 18 8
Globe Tel. & Tel. Ord.	1	5½*	7½*	30/–	+⅛	5 0 0
Do. do. Pref.	1	6	6	26/3	—	4 11 5
Great Northern Tel.	10	20	20	41	+1	4 17 7
Marconi-Marine	1	10	7½	23/9	–⅛	6 6 4
Oriental Telephone Ord.	1	12*	12*	57/6	—	4 3 8
Home and Foreign Trams, etc.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	3/9	—	—
Do. do. 2nd Pref.	5	Nil	Nil	3/9	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	9	–1	—
British Electric Traction Def. Ord.	,,	5	5	975	+225	—
Do. do. Pref. Ord.	,,	8	8	165	+15	4 17 0
Brazil Traction	$100	70 cts.	$1	12½	+3½	—
Brit. Columbia Elec. Rly, Pce.	Stock	5	5	95½	–3	5 4 9
Mexican Light Common	$100	Nil	Nil	1	—	—
Do. do. 1st Bonds	500	5	5	20	+2½	—
West Riding	1	6½	10	32/6	—	—
Manufacturing Companies.						
Aron Electricity Ord.	1	15	15	1½	—	8 17 6
Assoc. Elec. Ord.	1	10	10	38/–	+5/–	5 5 3
Do. Pref.	1	8	8	36/–	—	4 6 6
Babcock & Wilcox	1	10	10	37/6	+5/–	5 6 8
British Aluminium Ord.	1	10	12½	51/3	+5/–	4 17 6
British Insulated Ord.	1	20	20	4½	+5/–	4 9 0
Brush Ord.	5/–	Nil	Nil	5/9	+9d.	—
Callender's	1	20	20	4½	+5/–	4 6 7
Do. 6½% Pref.	1	6½	6½	31/3	—	4 2 4
Crompton Parkinson Ord.	5/–	12½	12½	25/–	+½	—
Do. 8% Pref.	1	8	8	37/6	—	4 5 4
Electric Construction	1	10	12½	32/6	–	7 13 10
Enfield Cable Ord.	1	25	25	2¾	+¼	—
English Electric	1	Nil	10	30/–	+6/–	6 13 4
Do. Do. Pref.	1	6½	6½	25/–	—	5 2 0
Ericsson Tel.	5/–	25	25	38/9	+⅛	3 4 8
Ever Ready	5/–	45	35	18,6	+1/6	9 9 2
Ferranti Pref.	1	7	7	27/6	—	5 2 0
G.E.C. Pref.	1	6½	6½	31/3	—	4 3 4
Do. Ord.	1	17½	20	77/–	+4/–	5 4 0
Henley's	5/–	15	20	20/–	+⅛	5 0 0
Do. 4½% Pref.	1	4½	4½	22/6	—	4 0 0
India-Rubber Pref.	1	5½	5½	21/3	—	5 3 6
Johnson & Phillips	1	10	12½	37/6	—	6 13 4
Lancashire Dynamo	1	20	25	55/–	—	9 2 0
Siemens Ord.	1	7½	7½	23/9	+½	6 6 4
Telegraph Construction	£1	7½	10	2½	+½	4 9 0

* Dividends are paid free of Income Tax.

New Patents

Electrical specifications recently published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 23, Southampton Buildings, London, W.C.2.

1937

256. "Device for tracing the trajectories of electrically charged particles in electric or magnetic fields." British Thomson-Houston Co., Ltd., and D. Gabor. January 5th, 1937. (491587.)

3387. "Accumulators." H. G. Andre. September 23rd, 1936. (491782.)

3531. "Regulating arrangements for electric rectifiers." Siemens Schuckertwerke Akt.-Ges. February 5th, 1936. (Cognate applications 3532/37 and 3533/37.) (491784.)

3615. "Electrical fuses." L. E. W. C. N. Davey. February 6th, 1937. (491650.)

3630. "Moving-contact electric current convertors." Siemens Schuckertwerke Akt.-Ges. February 21st, 1936. (491844.)

3718. "Manufacture of alternating-electric current rectifiers." A. L. Williams, L. E. Thompson, R. H. Cubitt, and Westinghouse Brake & Signal Co., Ltd. February 8th, 1937. (481785.)

4761. "Lighting systems for suspended metal obstructions in air-defence arrangements." J. Fodor. March 17th, 1937. (481713.)

6225. "Electric transformers." British Thomson-Houston Co., Ltd. (General Electric Co.) March 2nd, 1937. (491845.)

6276. "Suspension of electric, gas or other lamps in inaccessible positions." W. Slingsby & Co., W. Slingsby, W. N. Slingsby and T. J. L. Slingsby. March 3rd, 1937. (491786.)

6293. "Dynamo regulators." J. Lucas, Ltd., and J. A. Laird. March 3rd, 1937. (491715.)

6316. "Vehicles driven by battery supplied electric motors." H. G. Tumilty. March 3rd, 1937. (491788.)

6317. "Lifting truck for removing batteries from electrically driven vehicles and replacing same." H. G. Tumilty. March 3rd, 1937. (491789.)

6686. "Load resistances or the like for high-frequency alternating currents." J. L. Pawsey and E. C. Cork. March 6th, 1937. (491794.)

6718. "Electro-magnetic relays." Automatic Telephone & Electric Co., Ltd., J. C. W. St. Graham and H. D. Sharpe. March 6th, 1937. (491662.)

6723. "Oscillation generators embodying electron discharge devices." Marconi's Wireless Telegraph Co., Ltd., and D. A. Bell. March 6th, 1937. (491663.)

6791. "Operating mechanism for electric switchgear." General Electric Co., Ltd., and F. J. Keeley. March 8th, 1937. (491598.)

6814. "Thermionic amplifiers." Standard Telephones & Cables, Ltd., and C. E. Strong. March 8th, 1937. (491803.)

6825. "Systems controlling the sequential actuation of electrically operated soot-blowers." British Thomson-Houston Co., Ltd., S. N. Bourne and H. F. Jefferson. March 8th, 1937. (491915.)

6826. "Soot blowers." British Thomson-Houston Co., Ltd., and H. F. Jefferson. March 8th, 1937. (491916.)

6830. "Methods of modulating carrier-waves and circuits therefore." Fernseh Akt.-Ges. March 6th, 1936. (491805.)

6840. "Light-diffusing devices for lighting units." Walmsley Patent Lamp Co., Ltd., and E. Walmsley. March 8th, 1937. (491807.)

6915. "Alternating- or direct-current electric motors." Siemens-Schuckertwerke Akt.-Ges. March 9th, 1936. (Cognate application 6916/37.) (491923.)

6932. "Fluorescent reflectors." British Thomson-Houston Co., Ltd. March 9th, 1936. (491808.)

7005. "Cathode-ray visual tuning devices." Ferranti, Ltd., and A. L. Chilcot. March 10th, 1937. (491860.)

7020. "Electric switches of the tumbler type or like electrical fittings." R. Bain and N. Allday. March 10th, 1937. (491929.)

7023. "Method and device for reducing and multiplying acoustic frequencies." L. Gabrilovitch. March 10th, 1936. (491937.)

7062. "Circuit arrangements for separating electric signal pulses." E. L. C. White. March 10th, 1937. (491728.)

7089. "Telephone systems and automatic switches suitable for use therein." Automatic Telephone & Electric Co., Ltd., C. E. Beale and I. T. Richards. March 10th, 1937. (491865.)

7113. "Electric convertor devices which operate with periodically closed switch contacts." Siemens-Schuckertwerke Akt.-Ges. March 10th, 1936. (491869.)

7188. "Modulated carrier-wave receivers." British Thomson-Houston Co., Ltd., and D. S. Watson. March 11th, 1937. (491873.)

7194. "Hot cathode for cathode-ray tubes." Radioakt-Ges. D. S. Loewe. March 12th, 1936. (491874.)

7219. "Automatic switches for use in telephone or like systems." Automatic Telephone & Electric Co., Ltd., C. E. Beale and I. T. Richards. March 11th, 1937. (491878.)

7230. "Electrolytic manufacture of alkali metals." Imperial Chemical Industries, Ltd. March 11th, 1936. (491880.)

7263. "Electric oscillation generators." C. L. Faudell and E. L. C. White. March 12th, 1937. (491934.)

7299. "Television and like receivers." Baird Television, Ltd., and A. H. Gilbert. March 12th, 1937. (491886.)

7300. "Electron-discharge devices for use in television and like systems." Baird Television, Ltd, and V. A. Jones. March 12th, 1937. (491887.)

7310. "Electric condensers." Dubilier Condenser Co. (1925), Ltd. March 13th, 1936. (491889.)

7315. "Oscillatory circuits comprising negative resistance." General Electric Co., Ltd. (Siemens & Halske Akt.-Ges.). March 12th, 1937. (491603.)

7327. "Electric-current converting systems." British Thomson-Houston Co., Ltd. March 12th, 1936. (491732.)

7337. "Construction of electric-discharge devices and electric incandescent lamps." Standard Telephones & Cables, Ltd., and R. A. L. Cole. March 12th, 1937. (491892.)

7339. "Telegraph relays." Standard Telephones & Cables, Ltd., and W. H. M. Hellier. March 12th, 1937. (491893.)

7379. "Electric time switches." A. Cianchi. March 12th, 1937. (491936.)

7572. "Electrical wire resistors." G. Canegallo. March 15th, 1937. (491605.)

7723. "Devices for measuring and testing electric resistances." Elektrische Glühlampen Fabrieken J. Kremenesky Akt.-Ges. March 19th, 1936. (491898.)

8052. "Generation of oscillations of saw-tooth wave-form." E. J. Alway. March 18th, 1937. (491736.)

8802. "Artificially cooled high-pressure metal-vapour electric-discharge lamps." Siemens Electric Lamps & Supplies, Ltd., and J. N. Aldington. March 25th, 1937. (491738.)

10062. "Apparatus for chopping electrical impulses." G. J. Scoles and Metropolitan-Vickers Electrical Co., Ltd. April 8th, 1937. (491741.)

10546. "Telephone systems." Automatic Telephone & Electric Co., Ltd., C. E. Beale and I. T. Richards. April 13th, 1937 (491901.)

11422. "Direct-current dynamo-electric machines." G. A. Juhlin, E. P. Hill and Metropolitan-Vickers Electrical Co. April 21st, 1937. (Cognate application 16056/37 and 1530/38.) (491743.)

12388. "Television receivers." Scophony, Ltd., J. Sieger and S. H. M. Dodington. April 30th, 1937. (491611.)

12829. "Telephone systems." Ericsson Telephones, Ltd., and E. S. Distin. May 5th, 1937. (491612.)

13027. "Crossings of overhead trolley conductors for electric traction." T. M. Watson. May 7th, 1937. (491744.)

14506. "Electric communication cables and the manufacture thereof." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.). May 25th, 1937. (491614.)

15457. "Electric lamp supports adapted to be worn as spectacles." V. J. C. Guichard. June 22nd, 1936. (Cognate application 15458/37.) (491677.)

19051. "Circuit arrangements for suppressing undesired frequencies in wireless receiving apparatus." G. Schaub Apparatebauges. July 9th, 1936. (491903.)

19951. "Cathode-ray tubes comprising luminescent material excited by the cathode-ray." General Electric Co., Ltd., L. C. Jesty and J. Sharpe. July 19th, 1937. (491748.)

20072. "Electric motor control systems." Westinghouse Electric & Mfg. Co. August 29th, 1936. (491749.)

20910. "Grid controlled valve converting apparatus." Allmänna Svenska Elektriska Aktiebolaget and U. Lamm. July 28th, 1937. (491751.)

22008. "Electron-discharge devices." Standard Telephones & Cables, Ltd. October 7th, 1936. (491685.)

24735. "Indicating apparatus for transformer loads." British Thomson-Houston Co., Ltd. September 10th, 1936. (491754.)

24843. "Electro-magnetic locks." J. P. James. September 13th, 1937. (491908.)

25460. "Automatic impulse emitter for telephonic apparatus." J. Vanheerswynghels. September 18th, 1936. (Cognate application 25461/37.) (491755.)

26632. "Control mechanism for electrically driven machines feeding webs of fabric." E. Gessner Akt. Ges. October 29th, 1936. (491627.)

27146. "Electric spot or seam welding apparatus employing controllable discharge vessels." Siemens Schuckertwerke Akt. Ges. October 6th, 1936. (Cognate applications 27147/37 and 27148/37.) (491757.)

27279. "Electron image dissecting apparatus." Zeiss Ikon Akt. Ges. November 13th, 1936. (491758.)

30737. "Electrical water-heaters." C. H. Groth-Nuennke. November 14th, 1936. (491760.)

31151. "System of guiding by radio-electric waves." Standard Telephones & Cables, Ltd. December 17th, 1936. (491762.)

36168. "Variable selectivity radio receivers." Hazeltine Corporation. January 21st, 1937. (491693.)

1938

1664. "Variable electrical condensers." A. H. Hunt, Ltd. February 23rd, 1937. (491642.)

2969. "Batten-holders for electric lamps." E. De Figueiredo. March 25th, 1937. (491831.)

4066. "Electric-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 12th, 1937. (491768.)

5402. "Electric incandescent lamp." Vereinigte Gluhlampen und Elektrizats Akt. Ges. February 20th, 1937. (491769.)

5858. "Sparking plugs." L. Krai. February 25th, 1937. (491837.)

6314. "Supply circuits including electric-discharge devices." British Thomson-Houston Co., Ltd. February 27th, 1937. (491771.)

6619. "Measurement of electric power, particularly high-frequency electric power." Siemens & Halske Akt. Ges. March 3rd, 1937. (491772.)

7252. "Electron multipliers." Standard Telephones & Cables, Ltd. July 31st, 1936. (Divided out of 14180/37.) (491773.)

A Large Trolley-bus Order

The Associated Equipment Co., Ltd., has secured the whole of the contract for the supply of trolley-buses and oil-engined vehicles for the Brighton Corporation Transport Department. The value of this contract is over £104,000 and it includes forty-four two-axle trolley-buses.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Aberdeen.—October 14th. County Council. Electrical work at forty-one houses at Waterton estate. County Clerk, 22, Union Terrace.

October 14th. Electrical work at Fyvie estate (twenty houses). County Clerk, 22, Union Terrace.

Australia.—MELBOURNE.—October 25th. Posts and Telegraphs Department. Outside broadcast amplifiers and equipment. (T. 26878/38.)*

November 2nd. Victorian Railway Commissioners. Electric winder and accessories for the new Kirrak Colliery, Wonthaggi. (T.Y. 27281/38.)*

October 31st. City Council. Five low-voltage air-break circuit-breakers (T.Y. 27157/1938.)*

BRISBANE.—December 12th. City Electric Light Co., Ltd. One 25,000-kW turbo-alternator and accessories. (T.Y. 26867/38.)*

VICTORIA.—November 8th. State Electricity Commission. Varnished cambric and p.i. cable. (T. 27159/38.)*

November 22nd. Two 20,000-kVA, three-phase transformers. (T. 27406/38.)*

Birmingham.—November 4th. Electric Supply Department. Construction of the main buildings for Ham Hall "B" power station. (September 30th.)

Bristol.—October 14th. Electricity Department. One 150-kV d.c. testing equipment. (September 30th.)

Bury.—October 31st. Corporation. Electric lighting and power installation at the new Town Hall. Town Clerk, Municipal Offices (deposit £2 2s.).

Cheadle and Gatley.—October 17th. Electricity Department. Extensions to 6.6-kV switchgear for the Larkhill estate substation, Adswood, Cheshire. (September 30th.)

Chester.—October 17th. County Council. Electrical installation comprising electric lighting and power services, electric lifts, tubing for internal telephones, watchmen's tell-tales, electric clocks, &c., at the new County Offices. Clerk of the County Council, St. John's House (deposit £10).

Coventry.—October 10th. Corporation. Pumping plant comprising two electrically driven borehole pumps, electric control equipment and all accessories. F. Smith, Town Clerk, Council House (deposit £3).

Darlington.—October 22nd. Electricity Department. Wiring installations in Council houses. (See this issue.)

Edinburgh.—October 24th. Scottish Special Areas Housing Association, Ltd. Electric lighting installation at Crofthead estate, West Lothian (ninety-eight houses). Secretary, 73a, Shandwick Place.

Egypt.—CAIRO.—October 20th. Ministry of Public Health. Four air-cooled, 25-kVA, three-phase transformers. (T. 27375/1938.)*

Elgin.—October 12th. Town Council. Electrical work at Deanshaugh Farmhouse. Town Clerk.

Farnworth.—October 25th. Electricity Department. One 1,000-kVA transformer and wiring cables. (See this issue.)

Fife.—October 18th. County Council. Electric lighting at additions to County Offices, Kirkcaldy. County Clerk, Cupar (deposit £1 1s.).

London.—Commissioners of H.M. Works. October 17th. Lighting protection installation at Glascoed R.O.F. (September 30th.)

October 24th. Sub-station switchgear, transformers, &c., at Bridgend R.O.F. (September 30th.)

October 19th. Electrical wiring at Bishopton R.O.F. (September 30th.)

Manchester.—October 10th. Electricity Department. One electrically propelled tower-ladder vehicle. (September 30th.)

Mansfield.—October 24th. Electricity Department. P.i. lead covered cable. (September 30th.)

New Zealand.—WELLINGTON.—January 17th, 1939. Public Works Department. Outdoor and indoor cable boxes, distribution and connector boxes, &c. (T.Y. 27084/38.)*

November 30th. Posts and Telegraph Department. Telephone cable. (T.Y. 26940/38.)*

DUNEDIN.—October 31st. Electric Power and Light Department. Four 400-A circuit-breakers. (T. 26943/38.)*

AUCKLAND.—November 21st. Electric Power Board. 7,000 yd. of p.i. cable, thirty joint boxes, two-end dividing boxes, together with necessary jointing material and compound. (T. 27082/38.)*

Northallerton.—October 12th. North Riding Education Committee. Installation of electric lighting and power at the new high school for girls, Richmond, Yorkshire. F. Barraclough, secretary, Education Offices, County Hall.

Poole.—October 13th. Town Council. Electrically driven centrifugal unchokeable type pumps with motors in duplicate. Borough engineer, Municipal Buildings (deposit £1 1s.).

Portsmouth.—October 18th. Electricity Undertaking. 33-kV p.i. lead-covered wire-armoured cable. (September 30th.)

Salford.—October 10th. Electricity Department. Materials required for the assisted wiring scheme, including lamps and shades (September 30th.)

South Africa.—PRETORIA.—October 20th. Union Tender and Supplies Board. One 1,000-kVA transformer. (T. 26989/38.)*

CAPE TOWN.—October 10th. Electricity Department. Pole mounting core type transformers. (T.Y. 26749/38.)*

October 12th. Electricity Supply Commission. One 33-kV oil-circuit-breaker and two 300-kVA and two 500-kVA transformers. (T.Y. 26971/1938.)*

JOHANNESBURG.—October 13th. Public Works Department. Five electric lighting plants, together with necessary switchgear. (T. 26991/38.)*

October 13th. Electricity Department. Ten 20,000/6,000-V transformers and one bank comprising three single-phase limiting reactors. (T. 26996/38.)*

October 15th. City Council. High- and low-voltage p.i. power cable. (T.Y. 27094/38.)*

October 19th. Circuit-breaker testing equipments. (T.Y. 27090/1938.)*

Stoke-on-Trent.—November 2nd. North West Midlands J.E.A. Painting of chimney stacks, &c. Overhead transmission lines. (September 30th.)

Uruguay.—MONTEVIDEO.—October 18th. State Electricity Supply and Telephones Administration. Galvanised steel cable. (T.Y. 26947/38.)*

Walsall.—October 24th. Electric Supply Department. Materials and apparatus for twelve months. (See this issue.)

* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Aberdeen.—Housing Committee. Accepted. Electric lighting work at forty-eight houses at Anderson Drive South (£312).—R. A. Mair.

Birmingham.—Electricity Committee. Accepted. Completion of the electrical installation at the Beeches Road Council School, Perry Barr (£501).—W. S. Vaughton. Electric lighting installation at the Shenley Fields Homes (£945).—Gordon Hughes Electrical Co.

Cardiff.—Water Committee. Accepted. Electric pumping units (£124).—Harland Engineering Co.

Electricity Committee. Accepted. 33,000-V circulator conductor cables (£1,706) and pilot cable (£68).—Pirelli-General Cable Works.

Chelmsford.—Highways Committee. Accepted. Pump motor switchgear and piping (£219).—Blackstone & Co.

Finchley.—Electricity Committee. Accepted. Lighting brackets.—A. Edge & Co. Control equipment for mercury-discharge lighting.—Wardle Engineering Co.

Glasgow.—Cleansing Committee. Accepted. Electric traction batteries (£6,385).—Tudor Accumulator Co.

Transport Committee. Accepted. Telephone and test cable.—Craigpark Electric Cable Co.

Leeds.—Housing Committee. Accepted. Electrical installation at houses on various estates.—Allenby & Stokell.

Gas Committee. Accepted. Emergency electricity generating plant at the gas works (£3,446).—Ashworth & Parker.

Health Committee. Accepted. Electrical work at St. James' Hospital (£1,227).—T. W. Sampson.

London.—L.C.C.—Wiring and fittings for electric lighting, &c., in blocks of dwellings on the Springfield estate, Wandsworth:—

	£		£
Holliday & Son (Electrical). Accepted	**4,987**	W. H. Gaze & Sons	6,443
Archibald Meckhonik	5,107	Francis Polden & Co.	6,455
Pinchin and Walton	5,187	Alexander Hawkins & Sons ...	6,955
W. J. Furse & Co. (London) ...	5,368	G. E. Taylor & Co.	7,107
Samuel Reed & Sons	6,133	Newman and Watson	7,818

Wiring and fittings for the installation of electric lighting in the main building and porter's lodge at Hackney casual ward:

	£		£
Leonard G. Tate & Co. Accepted	**457**	Anderson, Angell & Co.	754
Burdette & Co.	503	Ilford Electrical Co.	785
Holliday & Son (Electrical) ...	523	Bower Engineering Works (Electrical and General)	785
Davis Myer & Co	560	Jacob, White & Co.	798
G. Hopkins & Sons	618		
Archibald Meckhonik	672		

Manchester.—Electricity Committee. Accepted. Sound film projector for showrooms.—B.T.H. Co. Reblading turbine at Barton power station.—Met.-Vick. Elecl. Co. Oil fire extinguishing apparatus.—Mather & Platt.

Transport Committee. Accepted. Metal rectifier charging plant for garage.—Oldham & Son.

Education Committee. Accepted. Electrical work at Chorlton High School.—F. H. Wheeler & Co.

Water Committee. Accepted. Converting and transforming plant at Longendale Works.—Electric Construction Co.

Salford.—Electricity Committee. Recommended. Three transformers (£1,150).—G.E.C.

Shipley.—Highways Committee. Accepted. Street-lighting lanterns and brackets.—G.E.C. Cast-iron boxes, &c.—Wardle Engineering Co.

Southgate.—General Purposes Committee. Accepted. Electrical installation at Town Hall extension (£1,239).—North-Met. E.S. Co.

South Shields.—Town Council. Accepted. Electrical fittings at the maternity hospital (£1,272) and electrical work on the No. 2 housing estate (£75).—A. J. Wares.

Tillicoultry.—Town Council. Accepted. Electrical work at Jamieson Gardens housing estate (£114).—Ormiston Bros.

West Bromwich.—Electricity Committee. Accepted. Meter-testing equipment.—Met.-Vick. Elecl. Co.

E.A.C. Production

As from October 1st production at the Vauxhall Works, South Lambeth Road, S.W.8, of the Electrical Apparatus Co., Ltd., will cease and the entire output will be concentrated at the enlarged works at St. Albans.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Reconstruction and extensions at St. Andrew's Cathedral (£10,000); the Bishop.

Ayr.—Houses, Mill Street and West Sanquhar Road; burgh surveyor.

Barnard Castle.—Houses (54); U.D.C. surveyor.

Berwick.—Houses, Walkergate and Hatters Lane; borough engineer.

Birmingham.—Extensions to premises of Birmingham Battery Co., Bristol Road, Selly Oak; C. Bryant & Son, Ltd., contractors, 55-65, Whitmore Road, Small Heath.

Blyth.—Houses (76), Plessey Road; T. Wilson, borough engineer.

Brighton.—Cinema, restaurant, &c., North Street; A. D. Macdonald, architect, 14, John Street, London, W.C.2.

Cardiff.—Church, St. Fagans Road; Presbyterian trustees. Extensions to Royal Infirmary, Glossop Terrace; governors.

Chelmsford.—Houses (62); R.D.C. surveyor. Development of Patching Hall estate; N. Evans, architect. Estate development, vicinity of Church Lane; W. E. Banjafield.

Cheltenham.—Houses (14), Grove estate; Wheeler & Mansell.

Cheshire.—Schools, Stockton Heath, near Warrington; F. Anstead Browne, architect, County Offices, The Castle, Chester.

Chester.—Houses (12), Stocks Avenue; S. Grimshaw.

Chipstead.—Fire station, Chipstead Valley Road (£13,650), for U.D.C.; W. A. Pite, Son & Fairweather, architects, 13, Carteret Street, London, S.W.1.

Coseley.—Houses (108), for the U.D.C.; J. Webb, contractor.

Coventry.—Houses (78), Over Street and Tallants Road; Bayliss Bros., builders, Craven Street.

Croydon.—Extensions to factory, for Hancock & Co., Progress Way.

Derby.—Further extensions to Boundary House Infirmary (£11,000); C. H. Aslin, borough architect.

Devizes.—Cinema, St. John Street; A. Mather, architect, Leicester Square Chambers, London, W.C.2.

Droitwich.—Houses (55), Worcester-Kidderminster Road, Waresley; J. C. McWhirter.

Dronfield.—Houses (56), Cross Lane; U.D.C. surveyor.

Ely.—Houses (98); R.D.C. surveyor.

Essex.—Schools, Lodge Lane, Romford (£56,500), Waltham Abbey (£25,518) and extensions to junior school at Harold Court; county architect, Chelmsford.

Finchley.—Council offices (£82,740); Wm. Moss & Sons, Ltd., North Circular Road, N.W.2. Flats and shops, Regent's Park Road; Forster, Warren & Wilcox. Flats (24), Woodside Park Road; Sturt & Tivendale.

Glasgow.—Extensions to Notre Dame High School for Girls, for the E.C.

Greenock.—Extensions to Larkfield Auxiliary Hospital; superintendent, Royal Infirmary, Greenock.

Halifax.—Printing works, for Stott Bros.; Crossley & Radcliffe, Ltd., contractors,

Hamilton.—Houses (64), Greenfield, Burnbank; burgh surveyor.

Heston.—Houses (55), Sutton Hall estate; Wates, Ltd., London Road, Norbury.

Hetton-le-Hole (Co. DURHAM).—Houses (65), Hutton Street; A. H. Fennell, architect, Bridge End Chambers, Chester-le-Street, Durham.

Holywell.—Cinema, Coleshill Road, for Deeside Enterprise Cinemas Co., Ltd.; S. Foulkes, architect, Central Chambers, Colwyn Bay.

Hornchurch.—Factory, Glenfell Avenue, for F. T. Cull; H. G. Needham, architect, Earlham Grove, Forest Gate, E.7.

Hull.—Clinic (£10,000), for Hull Infirmary Board, Prospect Street; Gelder & Kitchen, architects, Hull.

Ince-in-Makerfield.—Houses (140), off Pennington Lane, for the U.D.C.; T. C. Jackson, contractor, Kent Street, Wigan.

Irthlingborough.—Houses (25), Addington Road; U.D.C. surveyor.

Isle of Wight.—Schools, Ryde and Cowes, for the Isle of Wight E.C.

Jarrow-on-Tyne.—Road house hotel, Leam Lane, near Jarrow (£20,000); Carruthers & Sons, contractors, 1, Heugh Terrace, South Shields.

Kilmarnock.—Bank premises, King Street (£23,000), for the Commercial Bank of Scotland, Ltd.; the manager.

Kirkintilloch.—Houses (50), Hillhead; burgh surveyor.

Lanarkshire.—Children's home, Hamilton (£52,000); county architect, Hamilton.

Leeds.—Occupation centre, Harehills (£11,461); Dunhill Bros. Flats, Sweet Street area (£213,378); H. D. Dyke.

Leigh.—Houses (186), Dakins estate; borough engineer.

Liverpool.—Hotel, Owring Park estate, Huyton, for Peter Walker, Warrington & Robert Cain & Son, Ltd., 105, Duke Street, Liverpool; L. Lucas & Son, contractors, 36, Eccleston Lane, Prescot, Lancashire. Office building, King Edward Street and Brook Street, for Watson McColl & Co., 18, Water Street; Evans & Williams, contractors, 63, Aspen Grove. Alterations and additions to Sir Alfred Jones Memorial Hospital, Church Road, Garston, for the trustees; John Williams (Liverpool), Ltd., contractors, 70, Collingwood Street.

London.—(BERMONDSEY).—Flats (170), Ainsty Street; borough engineer. (HAMMERSMITH).—Shops, Beadon Road; G.W.R. Co. (LEWISHAM).—Enlargement of Town Hall (£54,000); borough engineer.

Lowestoft.—Houses (59), Normanton Drive estate; J. A. Gaze & Sons.

Luton.—Premises for Commer Cars, Ltd.; Charles Jeyes, Ltd., contractors.

Manchester.—Enlargement of Queen's Road and Princess Road depots (£42,246); city engineer. Extensions to factory, for the Pneumatic Engineering Appliances Co., Ltd., Derby Street.

Mansfield.—Houses (12), Bull Farm estate; borough engineer. Council offices, Chesterfield Road; R.D.C. surveyor.

Middlesbrough.—Houses (20), for T. Duncanson; H. C. Garbutt, architect, 18, Albert Road. Houses (10); S. and E. Lowe, builders, 20, Lansdowne Road. Houses, Lansdowne Road and Lancaster Road; F. Jackson, architect, Queen's Square. Cinema, Longlands Road; Thompson's Enterprises, Ltd., Palladium Buildings. Cinema, Tunk Road, for T. Thompson; Kitching and Co., architects, 21, Albert Road.

Morecambe.—Houses (12), Knowlys Drive; H. Hillman & Sons. Toffee factory, James Street; F. Ratcliffe.

Newcastle-on-Tyne.—Houses (32), in flats, for C.C.; R. G. Roberts, 18, Cloth Market. Extensive conversion of houses, Salville Place, into shops and business premises; W. Milne, Ltd., contractor, Manor Chare.

Northampton.—Houses (11), Delapre Crescent; Acme Building Co. Houses (11), Spinney Hill; Chowns, Ltd. Offices, Regent Square, for the Ideal Benefit Society; T. Wilson & Son, Ltd., builder, 65, Sheep Street. Extensions to Town Hall, St. Giles Street; P. Thomas, architect.

Northern Ireland.—(BELFAST).—Cinema, Newtownards Road, for the City & Suburban Cinemas, Ltd.

Ripon.—Houses (22), Gallows Hill; city engineer.

Salford.—School, Weaste Lane, Pendleton; H. Greenhalgh, architect, 15, Mawdesley Street, Bolton.

Scarborough.—Swimming baths, White House (£46,000); H. V. Overfield, borough engineer.

Sheffield.—Cinema, Sheffield Lane, Paddocks, for M. J. Gleeson, Ltd. Warehouse and offices, Arundel Street, Matilda Street and Eyre Lane; Pilkington Bros., St. Helens, Lancashire. Workshop and canteen, Townhead Street, for Joseph Thompson (Sheffield), Ltd., Townhead Street; George Longden & Sons, Ltd., contractors, Parkwood Works, Sheffield. Houses (34), Ashbury Lane; Newhouses (Builders), Ltd. Houses (186), Parson Cross estate (£75,041); H. Charlesworth, Ltd.

Slough.—Houses (300), Baylis Court estate; U.D.C. surveyor.

Southgate.—Houses (56), Arnos Grove estate; Davis Estates, Ltd.

South Shields.—Houses (91), Highfield Grove, for Colonel R. Chapman; G. R. Smith and Partners, architects, Winchester Street. Houses, between Marsden Road and Prince Edward Road, for the T.C.; borough engineer. Houses (34), Wenlock Road; J. Reid, borough engineer. Offices, West Holborn, for Harton Coal Co.; J. Kennedy, builder, Vespasian Street. Shops and flats, Prince Edward Road; Page, Son and Bradbury, architects, 75, King Street. Alterations to schools for the E.C. (£40,000); J. S. Glover, quantity surveyor, 29, King Street.

Sutton Coldfield.—Houses (12), Bakers Lane; Modern Homes, Ltd. Houses (13), Darnick Road; R. W. Stanton.

Tottenham.—Houses (36), Scotland Green estate; W. J. Jerram, 11, Sandford Road, E.6.

Tynemouth.—Houses (10), Balkwell Avenue; J. Dixon. Houses (18), Mortimer Avenue; G. H. Gray.

Whetstone (MIDDLESEX).—Flats (10), Swan Lane; C. W. D. Walden, architect.

Whiston (LANCASHIRE).—Houses (48), Regal Drive and St. George's Avenue; R. & H. Fletcher, Ltd., Lyddesdale Road, Cleveleys, Blackpool.

York.—Houses (14), Green Lane estate; J. Greenwood. Swimming bath, Burton Croft; J. B. Morrell. School; St. Georges R.C. trustees.

Flue-gas Treatment

FOR his address as chairman of the London Section of the Society of Chemical Industry on Monday, Dr. R. Lessing took as his text "The Development of a Process of Flue-Gas Washing without Effluent." He referred to the condition attached by the Electricity Commissioners to their consent in 1930 to the erection of the new Fulham power station that the most efficient methods that were usually practicable should be adopted to prevent the emission of smoke and grit and sulphur compounds. Opposing local authorities pressed for an upper limit of 0.02 gr. of sulphur per cu. ft. of chimney gas, but the possibility of working to this limit was doubted. Actually the total acidity at Fulham during 1937 was only 0.0046 gr. per cu. ft. of dry gas.

A coal consumption was then anticipated of more than 2,000 tons per day which would result in the liberation of 1,000 millions cu. ft. of combustion gas resulting in the emission of about 30 tons of dust and the equivalent of 100 tons of sulphuric acid.

Dr. Lessing then went on to describe in detail the experiments carried out over a period of fifteen months at Fulham and at the Billingham works of Imperial Chemical Industries, Ltd. Details of the plant by James Howden (Land), Ltd., which is installed at Fulham power station (the same type has also been installed at the Tir John station of Swansea Corporation) has been given in a paper read by Messrs. W. C. Parker and H. Clarke before the Institution of Civil Engineers (ELECTRICAL REVIEW, March 25th).